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THESIS

**WHY SOME PEOPLE LIVE AND SOME PEOPLE DIE IN
THE SAME EMERGENCIES AND DISASTERS: CAN THE
GENERAL PUBLIC BE TAUGHT TO SAVE
THEMSELVES?**

by

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March 2013

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13. ABSTRACT (maximum 200 words) <p>Each year the United States suffers approximately 3,000 fire-related deaths and approximately 4,700 work-related deaths. Hundreds of additional fatalities occur annually due to severe weather, as well as manmade and natural disasters. The specific research question addressed by these sobering statistics is: Can the general public be taught to save themselves during emergencies and disasters? To that end, the research answered the following questions: 1. What research has been previously performed to examine civilian survivability? 2. What are the cognitive functions that allow or prohibit people in making correct life-saving decisions? 3. Are there patterns to the way that people process information and perceive danger? 4. What are the critical elements that allow some people to survive and others to perish? 5. What can be done to increase the chances that civilians will make the correct choice of action during emergencies and disasters?</p> <p>Through descriptive research, the purpose was to examine and reveal the importance of human behavior and to produce recommendations that may help reduce fatalities. The literature review found an abundance of material available to address the topic. As heuristics (science of trial and error), utility theory (methodical evaluation of alternative choices), human reactions, such as fear, intuition, emotion, and past experience, and group versus individual dynamics each impact the decision-making process, the research concluded that the general public can be taught how to perform and react appropriately during emergencies. The recommendations included legislating mandatory training on emergency action plans in the workplace, enhance the efforts of emergency responders in public education, and develop public/private partnerships to provide realistic information and scenario-based drills that the public can comprehend and participate in.</p>				
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EMERGENCIES AND DISASTERS: CAN THE GENERAL PUBLIC BE
TAUGHT TO SAVE THEMSELVES?**

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ABSTRACT

Each year the United States suffers approximately 3,000 fire-related deaths and approximately 4,700 work-related deaths. Hundreds of additional fatalities occur annually due to severe weather, as well as manmade and natural disasters. The specific research question addressed by these sobering statistics is: Can the general public be taught to save themselves during emergencies and disasters? To that end, the research answered the following questions: 1. What research has been previously performed to examine civilian survivability? 2. What are the cognitive functions that allow or prohibit people in making correct life-saving decisions? 3. Are there patterns to the way that people process information and perceive danger? 4. What are the critical elements that allow some people to survive and others to perish? 5. What can be done to increase the chances that civilians will make the correct choice of action during emergencies and disasters?

Through descriptive research, the purpose was to examine and reveal the importance of human behavior and to produce recommendations that may help reduce fatalities. The literature review found an abundance of material available to address the topic. As heuristics (science of trial and error), utility theory (methodical evaluation of alternative choices), human reactions, such as fear, intuition, emotion, and past experience, and group versus individual dynamics each impact the decision-making process, the research concluded that the general public can be taught how to perform and react appropriately during emergencies. The recommendations included legislating mandatory training on emergency action plans in the workplace, enhance the efforts of emergency responders in public education, and develop public/private partnerships to provide realistic information and scenario-based drills that the public can comprehend and participate in.

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LIST OF ACRONYMS AND ABBREVIATIONS

CERT	Community Emergency Response Team
CHDS	Center for Homeland Defense and Security
EAP	Emergency Action Plan
ESP	Extrasensory Perception
FDNY	Fire Department, City of New York
FEMA	Federal Emergency Management Agency
FIDE	Fédération Internationale des Échecs (a.k.a. World Federation of Chess)
HAZ. MAT.	Hazardous Material
IRB	Institutional Review Board
NETC	National Emergency Training Center
NFIRS	National Fire Reporting System
NISB	National Institute of Building Sciences
NIST	National Institute of Standards and Technology
NPS	Naval Postgraduate School
NYC	New York City
NYC OEM	New York City's Office of Emergency Management
OSHA	Occupational Safety and Health Administration
PETS	Pets Evacuation and Transportation Act of 2006
RCNY	Rules of the City of New York
RPD	Rapid Primed Decision Making
USFA	United States Fire Administration
U.K.	United Kingdom
WTC	World Trade Center

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To all of the innocent and not so innocent victims of disasters and emergencies worldwide and your families, your sacrifices have not gone unnoticed, nor have they gone for naught. Learning from your experiences and applying them in the proper context and most respectful manner will help educate thousands who may have otherwise met similar fates. You live on, as others survive—based on what you have taught them—even in death.

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I. INTRODUCTION

The need to reduce human fatalities during emergencies and disasters has been acknowledged for centuries. Due to several major fires and tremendous losses of life and property in the 1800s and early 1900s, in 1925—commemorating the 40th anniversary of the Great Chicago Fire—President Calvin Coolidge declared the first Fire Prevention Week in the U.S. In his proclamation, he noted that during the preceding year alone, there were 15,000 U.S. fire deaths, and the majority of those deaths were preventable (United States Fire Administration, 2011a). However, it was not until the late 1960s that some of the most robust scientific research looked at the correlation between human behavior, emergencies, and fire fatalities, and how to reduce them (Corbitt, Given, Martin, Rhame, & Stone, 1967; Latane & Darley, 1968).

The general research problem to be addressed is: Why do some people live and some people die in the same or similar emergencies and disasters? In addition, more specifically, can the general public be taught to save themselves? The purpose of the research is to examine and reveal the importance of human behavior and, in circumstances where they are applicable, use those behavioral characteristics to help reduce fatalities. Through descriptive research, this paper will answer the following questions:

1. What research has been previously performed to examine civilian survivability?
2. What are the cognitive functions that allow or prohibit people in making correct life-saving decisions?
3. Are there patterns in the way people process information and perceive danger?
4. What critical elements allow some people to survive and others to die?
5. What can be done to increase the chances that civilians will make the correct choice of action during emergencies and disasters?

By answering these questions this research will help expand the realm of civilian survivability during emergencies and disasters. It will add to the current scientific knowledge on the subject and highlight the examination of several catastrophes of which there is a never-ending abundance.

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II. BACKGROUND AND SIGNIFICANCE

A. BACKGROUND

According to the Fire Department, City of New York's (FDNY's) "Annual Report" (Fire Department, City of New York, 2012a): The FDNY, now in its 149th year, currently consists of 13,719 Fire Officers, Firefighters, Emergency Medical Technicians, Paramedics, and Fire Marshals. These highly trained individuals are buttressed by 1,649 civilian support and trade personnel. The FDNY protects the lives and property of over 8 million residents and 50.5 million estimated annual travelers who visit the city's 322 square miles for work, vacation, and entertainment (New York City & Company, 2011).

The mission of the FDNY is to "Fight Fires, Save Lives and Minimize Property Damage, Provide Pre-Hospital Emergency Medical Services, Prepare for Terrorism, Investigate Cause and Origin of Fires, Enforce New York City (NYC) Public Safety Codes, Conduct Fire Safety Presentations and Events" (FDNY, 2011, p. 4).

From July 1, 2011, through June 30, 2012 (which is the FDNY's fiscal year 2012), the FDNY responded to 488,256 fires, including 25,254 structural fires. The FDNY also responded to 206,783 non-fire emergencies (such as water/water craft rescues, severe weather emergencies, elevators entrapments, utility emergencies, building collapses, technical rescue, hazardous material incidents, auto accident victim extrications, etc.) and 1,497,077 emergency medical calls—including 461,830 imminently life-threatening emergencies (e.g., respiratory/cardiac arrest, severe trauma, and/or burn injuries) (see Figure 1). Although there were 66 fire fatalities in New York City, representing the lowest in the city's/FDNY's recorded history (see Figure 2) (FDNY, 2012b), the FDNY was directly responsible for the saving or rescuing of 48,965 civilians who could not save or rescue themselves (FDNY, 2012a).

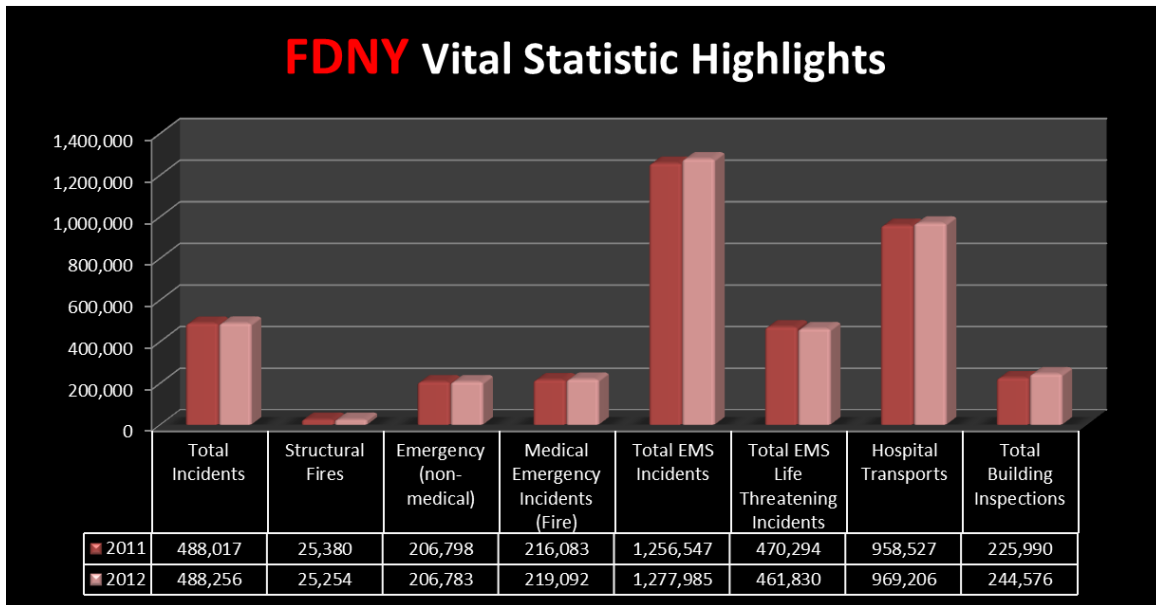


Figure 1. FDNY Vital Statistics 2011–2012

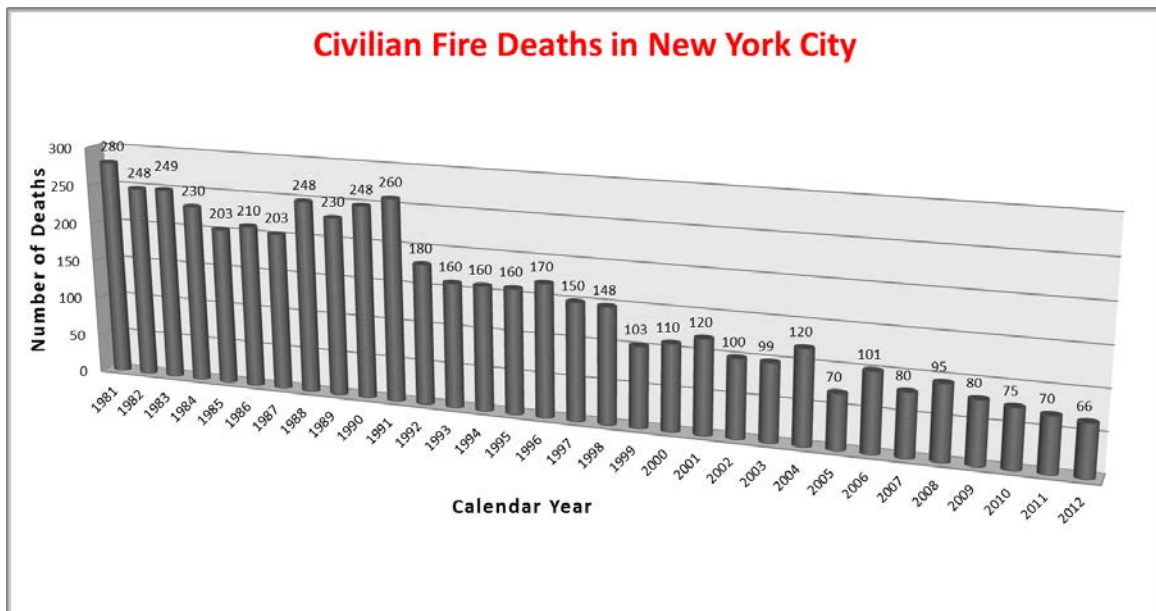


Figure 2. Historical 20-Year Trend of New York City Civilian Fire Fatalities

Additionally, in 2011/2012 under its public education responsibilities the FDNY provided 7,098 fire safety programs; conducted 27 neighborhood fatal fire informational campaigns; distributed 15,575 smoke detectors and 95,014 smoke/carbon-monoxide detector batteries; and trained 10,243 civilians in cardiopulmonary resuscitation (CPR)

(FDNY, 2012a). The FDNY was also the supporting agency in the education of over 1,500 volunteers, representing all five boroughs in the New York City Community Emergency Response Team (NYC CERT) Program.

The NYC CERT program trains civilians as part of an organized team to assist first responders during large-scale disasters and emergencies. CERT volunteers play an important role in community events and preparedness training. In 2011, CERT volunteers assisted at the World Police and Fire Games, the second-largest multi-sport event in the world. CERT volunteers also assisted family members of the victims involved in a fatal Bronx bus accident in March 2011 that killed 15 passengers and seriously injured 7 others, and helped staff evacuation shelters during Hurricane Irene in August 2011 (New York City Office of Emergency Management [NYC OEM], 2011).

To help educate New York City residents in preparing for emergencies and disasters, (OEM's) *Ready New York* Program has trained over 40,000 people, provided 800,000 Ready New York Emergency and Disaster Preparedness Guides and spent \$2.6 million in public disaster awareness and preparedness training, and multimedia ad campaigns (NYC OEM, 2011).

B. SIGNIFICANCE

The significance of the above background in relation to this thesis is the presumption that through the FDNY's life-saving performance and the educational deliverables provided by the City of New York in general, the city's OEM particularly, and the FDNY specifically, the numbers of civilians killed and injured in local emergencies and disasters may have been much greater had these preparedness inroads and educational outreach programs not been in place. Admittedly, the gauging or predicting of such a generality—which is far beyond the realm of this paper—may be difficult to prove. However, it is the lack of education nationally that may leave civilians at a significant disadvantage in their decision making when confronted by emergencies and disasters, which is the crux of this research.

This thesis will explore previous published works and scientific research performed to examine human survivability. Particularly, the research will examine the roles and relationships that heredity, intuition, and education may play in human life-and-death decision making. Acknowledging the long-standing debate about heredity versus environment and to what extent we are shaped by our everyday environmental experiences, the research will examine to what extent human behavior is a product of instincts and natural abilities, and to what extent it is based on learning, or learned behaviors.

The relevance of this thesis to both the author and to the homeland security enterprise is to examine previous works and produce recommendations that will ultimately result in the saving of lives during emergencies and disasters.

1. Deconstructing a Disaster

Perhaps one of the earliest published systematic analysis of human behavior in a disaster was written in 1920 by Samuel H. Prince. After witnessing a devastating cargo ship explosion that destroyed Halifax, Nova Scotia—killing 1,963 and injuring over 9,000 (22% of the city's population)—Prince deconstructed the explosion for his Ph.D. dissertation. Although the majority of Prince's work surrounds the context of social change and the rebuilding of Halifax after the disaster, it is his early recognition of human behavior during the event that is significant to this research. What he discovered was that human disaster personalities can be quite different from what we would expect. Prince (1920) offers the first evidence against the theory of individual role abandonment (people acting out of their normal routines) during a crisis and elaborates on the theory of "collective behavior" (years later described as "group think") (p. 17).

2. Panic, Hysteria and Savage Instincts

Although he witnessed incidents of "savagery," "thievery" (Prince, 1920, p. 50) and "pillaging" (p. 121), it was the acts of cooperation and organization during the initial rescue efforts that apply to this research. According to Prince, in the face major destruction in Halifax, there was a "lack of preparedness and governmental response"

(pp. 31, 64). Prince writes that this lack of governmental leadership left the populous “stunned and on their own for almost the entire first day” (p. 64).

Many of Prince’s theories of “group reaction; hysteria; primitive instinct and savagery” (pp. 36–40), together with his documented accounts of “human phenomena of hallucination; delusion; primitive instincts” (pp. 35–36) and “flight for self-preservation” (pp. 40, 50), have been debunked by later research. However, he was the first to attempt to tackle such a “virgin field of sociology” (p. 13). He was also one of the first to document first-hand accounts of human acts of *omission and commission* (p. 40) as contributing to the scope of the disaster and perhaps many of the resulting fatalities.

Although “panic, hysteria and savage instinctive tendencies are what most people conjure up when they think of the word disaster” (Ripley, 2008), the reality can be quite different. It does not mean that the occurrences of these reactions are “not known, it just means that maybe we haven’t been looking in the right places” (p. x). Perhaps, as this research will endeavor to delineate, we tend to look at isolated individual behavior rather than at the behavior of the masses.

3. Human Disaster Studies: A Languishing Science

According to Ripley (2008), after Prince’s death the field of human disaster studies languished up until the start of the cold war, often dated from 1947 (“Fast Chess,” 2011), when the threat of nuclear proliferation and the fear of mass casualties were omnipresent. After the fall of communism in 1991 (“Fast Chess,” 2011), Ripley believes that “...this field of study again waned—that is, until September 11, 2001” (p. ix).

However, the research conducted for this thesis discovered that during the 1970s and 1980s Kahneman and Tversky published many papers on human decision making. They explained that people make decisions based on emotional shortcuts and cognitive intuition first, and look for information to solidify their decisions second (Kahneman, Slovic, & Tversky, 1982). Based on earlier studies of Utility Theory, Kahneman and Tversky (Kahneman, Diener, & Schartz, 1999) applied this “methodological evaluation of alternatives choices and the satisfaction that each choice provides to the decision maker” to their study of “Hedonic psychology,” which is:

... the study of what makes experiences and life pleasant or unpleasant. This concept is concerned with feelings of pleasure and pain, of interest and boredom, of joy and sorrow, and of satisfaction and dissatisfaction. It is also accounts for a whole range of circumstances, from the biological to the societal, that alter suffering and enjoyment. (p. ix)

The resulting research of Kahneman and Tversky concluded with their theory of “heuristics.” In short, heuristics is the science of trial and error. They explained that people rely on emotional shortcuts to make themselves feel safe and happy, even though, based on presented facts, those feelings may be irrational and produce predictable errors (1982). To explain the mistakes that people make when estimating the effects of different scenarios on their future happiness, people tend to conjure up illusions to assist in considering the impact of one specific behavior over another. According to Kahneman and Tversky people tend to greatly exaggerate the importance of those illusional factors while overlooking the numerous and more obvious factors that would, in most cases, have a greater impact on their decisions, thus increasing uncertainty and producing more shortcuts.

Throughout the 1990s and into the 2000s studies examining fear and human reaction to disasters started to appear. Many of those publications grew out of several large-scale and well-documented disasters. Concentrating on the human aspects of those events greatly propelled the examination of civilian survivability and decision making.

4. Cognitive Functions

To learn if there are cognitive functions that allow or prohibit people to make correct life-saving decisions, this research will look at several publications on the topic. According to Ripley (2008), “about 90% of Americans live in areas that are at significant risk of earthquakes, hurricanes, tornadoes, floods, or targets for terrorism” (p. xvi). In drawing on such a statistic, Ripley proposes that it is very likely that each one of us in America will be affected (if not directly exposed) by a disaster at some time during our lives.

DeBecker (1997) believes that we all are qualified to answer life's highest-stakes question—will I live or die? Gonzales (2003) adds “that we can use evolutionary history and survival instincts to overcome the hazards of everyday life” (p. 44). Ripley (2008) disagrees. She feels that evolution can actually hurt us or let us down, mainly due to her conjecture that evolution has been unable to keep pace with our daily ever-changing world.

Ripley (2008) argues that the cognitive functions that allow or prohibit people from making correct life-saving decisions may just be an instinctual response. However, rather than relying on instincts, this research has determined that definitive action must be a conscious process during emergencies. Intuition and emotion may lead to incorrect choices and irrational behavior; therefore, individuals must make quick decisions based on an acknowledgement of how things are and not what they would like them to be.

5. It's All About Perception

Asking if there are patterns to the way people process information and perceive danger, the research supports the premise that people who survive disasters generally do not see themselves as victims (Gonzales, 2003).

Gonzales (2008) contends that humans work from mental *scripts* that we have been putting together in our memory banks from the second we emerged from the womb. These pattern judgments take time and, as Kahneman and Tversky (1982, 1999) found, can be misleading at best.

6. Death, Dying and Phases

Ripley (2008) offers that the phases of people processing information start with disbelief, followed by frantic deliberation (using mind scripts, utility theory and heuristics), and finally taking action (p. 7). Throughout her book, she refers to these phases as the *Survival Arc*. DeBecker (1997) agrees. He writes that animals must rely on intuition to survive in the wild because they lack the ability to reason. Animals do not get distracted as people do. Therefore, animalistic patterns of processing information and initiating action may be more *pure* as compared to that of humans. That is, animals run first and *reason* second.

As final proof of the patterns used by people to process and perceive danger, we look at Pan (2006). Pan contends that individual decision-making processes in emergencies are based on *instinct*, *experience*, and *bounded rationality*. Bounded rationality is in essence the understanding that, first, individuals may make judgment errors, and second, human behavior may deviate from the precepts of expected norms (p. 25). As previously introduced, there potentially exists several patterns that people use to process information and perceive danger. However, Pan's bounded rationality theory appears to be one that satisfactorily answers the research question: Can the public be taught to save themselves during emergencies and disasters? According to Pan, they can, but only if the public sees presented facts for what they really are and not as they perceive them to be.

7. Fear Versus Panic

If there are critical elements that allow some people to survive and others to perish, fear is certainly a critical element that may help or hurt people in emergencies. DeBecker (1997) describes fear as a "survival signal" that only sounds in the perceived presence of danger. He bases his book on the assumption that if people can learn to predict violent behaviors and imminent risk by paying attention to subtle and sometimes blatant clues of fear and intuition, they may be able to avoid becoming a victim. On the other hand, he adds that fear and intuition are "inevitably linked within the human psyche" (p. 7).

Ripley (2008) writes that "fear is instinctual and primitive to human beings and so are our reactions to it" (p. 43). However, this research has found that while fear is instinctual, how we react to it is based on perception. Therefore, our individual values and attitudes toward fear will determine our behavior. The research suggests that we may be able to use fear to make decisions rather than just react to it. Regarding fear as a critical element, Gonzales (2008) suggests that *behavioral scripts* or *mental models* may keep our mind closed. These scripts will then allow us to "ignore or discount new information" (p. 27). DeBecker (1997) writes that fear is different from panic, worry, or anxiety. Real fear, he says, initiates action (p. 285). On the other hand, panic, worry, and

anxiety make us pause and think rather than react. Moreover, according to DeBecker, that can be deadly (p. 285). As a critical element of the basic premises of this research, he points out that that panic, worry and anxiety are a choice (p. 285).

Another critical element that may allow people to survive or perish is the recognition of the effects of group think. Pan (2006) refers to what is now widely regarded as group think as “social inhibition” (p. 30). This occurs when individuals first turn to each other for social cues rather than taking action. Gonzales (2008) writes that group think often leads us into a false sense of reality (p. 93). Other aspects of group think as critical elements of survival are presented by Winerman (2004), and they include: the tendency not to evacuate immediately when a fire alarm sounds; unrealistic panic versus calmness within group settings; people stopping to assist others; the tendency to exit through the same door entered; and the fact that humans are inertia-driven and do not like to stop what they’re doing or even acknowledge an emergency that they perceive to be an inconvenience (p. 1).

C. CONCLUSION

This research has addressed the general research question: Can the general public be taught to save themselves during emergencies and disasters? The overwhelming evidence found throughout the research is that yes, they can. Therefore, the thesis argument has been developed around the notion that learning *is* vitally important to civilian survivability, and may be able to overcome inherent human abilities. A greater emphasis on education and training of the public is an integral component of the thesis recommendations.

If people learn to acknowledge and *act* on fear rather than *react* to it, and if they can be taught to adapt to what is happening in the now—rather than spending time wishing the situation was how they’d like it to be—then more lives would be saved.

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III. LITERATURE REVIEW

The need to reduce human fatalities during emergencies and disasters has been acknowledged for centuries. Due to several major fires and tremendous losses of life and property in the early 1800s and early 1900s, in 1925—commemorating the 40th anniversary of the Great Chicago Fire—President Calvin Coolidge declared the first Fire Prevention Week in the U.S. In his proclamation, he noted that during the preceding year alone, there were 15,000 U.S. fire deaths, the majority of which were preventable. (USFA, 2011a) However, it was not until the late 1960s that some of the earliest scientific research began to look at the correlation between human behavior, emergency and fire fatalities, and how to reduce them (Corbitt, Given, Martin, Rhame, & Stone, 1967; Latane & Darley, 1968).

This literature review will strive to examine relevant sources to determine if people can be taught to save themselves during emergencies and disasters. According to Ripley (2008), nine out of every 10 Americans (or 90%) live in areas that are at significant risk of earthquakes, hurricanes, tornadoes, floods, or targets for terrorism (p. xvi). It may appear that such a statistic might engender each of us to make haste in protecting ourselves, our loved ones, and our property. However, as the literature reveals, most often that is not the case.

A. WHAT WE KNOW

What we know is that annually, the U.S. suffers an average of over 3,000 fire deaths (USFA, 2011b), and over 4,600 workplace fatalities (Bureau of Labor Statistics, 2012). Additionally, although no exact statistical number could be found, it was readily acknowledged throughout the research process that hundreds of additional deaths occur in the U.S. every year due to severe weather, and both manmade and natural disasters. So, why are these death tolls so high? As Ripley (2008) asks: “Is there something that happens in our brains to make us react in certain ways? Are we culturally conditioned to risk our lives for strangers? Or, are we evolutionarily programmed to freeze in emergencies?” (p. xi). According to Gonzales (2003), 75% of people caught in a

catastrophe either freeze or simply wander about in a daze (p. 38). Therefore, what makes the other 25%—those who survive—so special? Is it luck? Not according to Ripley. She states that luck is, at best, unreliable, and that we have more control over our fate than we think; we just need to stop underestimating ourselves (2008, p. xvii).

The literature supports the premise that the people who survive disasters generally do not see themselves as victims, nor do they waste time and energy complaining about the bad things that have happened or are happening to them (Gonzales, 2008). In summary, the literature reviewed for this research suggests that people *can* be taught how to act in emergencies. However, the issue of controlling emotions and acknowledging human thought processes may be difficult for the general public to comprehend.

B. WHAT WE DO NOT KNOW

DeBecker (1997) laments that we all are qualified to answer life's highest-stakes question—will I live or die? Gonzales (2003) adds that we humans work from mental scripts that we have been putting together in our memory banks from the second we emerged from the womb. Thus, he feels, we can use evolutionary history and survival instincts to overcome the hazards of everyday life (p. 44). Ripley (2008) disagrees. She feels that evolution can actually hurt us or let us down, mainly due to her conjecture that evolution has been unable to keep pace with our daily ever-changing world. Further, Ripley believes that risk may be too complex for humans to understand. In our world's current state of "Extremistan" (an environment where huge, unpredictable events [viz. "Black Swans"] can happen to anyone, anywhere [Nassin, 2010, p. 34]), "the value placed on old tricks to overcome new challenges simply do not work" (Ripley, 2008, p. 27).

Gonzales (2003) contends that we are born as *generalists* and we are curious about everything. Then, as we grow older and learn, we become more of a *specialist* with varying degrees of narrowed focus (p. 14). Generalization, he says, "enables us to keep a broad range of knowledge that may assist us when danger or disaster strikes" (p. 15). Liking this concept to the daily drudgery of workers in high-rise office buildings, their daily routine takes them through the lobbies of their buildings to the elevator. The

elevator doors open, they step in, turn around, face front, and look up. Why do we do that? There is no rule or law that requires such a practice. There are no lessons in elevator usage that teaches it, yet we all do it. Is this human conditioning? Or, is it group think mentality (which we will discuss later)? When the elevator reaches the desired floor the doors open and the worker goes to his or her desk/office/cubicle and begins to work. When it is break time or at the conclusion of his or her work day they follow the same routine in reverse. This researcher has always been amazed by how many of these workers have no idea where the exit stairways are, nor do they think about it. Most of them never even pay attention to the “you are here signs” that remind (and show) them where the stairs are to use in case of emergency. That is why the first two things flight attendants do on an airplane are: Make sure your seatbelt is securely fastened and make note of the nearest emergency exits! This is the narrowing of human focus as previously introduced by Gonzales (2003). He also believes that modern society has made us “lazy and susceptible” to previously unknown threats (front inside cover). To combat those threats, Gonzales (2008) offers that “the tools of everyday survival are: curiosity, always seeking new information; awareness, knowing where one is physically and mentally at all times; and attention, noting the way things are and being open to change” (pp. 14–16).

1. Fear Versus Panic

While attributing fear to a “survival signal” that only sounds in the perceived presence of danger, DeBecker (1997) bases his book on the assumption that if people can learn to predict violent behaviors and imminent risk by paying attention to subtle and sometimes blatant clues of fear and intuition, they may be able to avoid becoming a victim (p. 7).

Expounding on the topic of fear, Ripley (2008) writes that fear is instinctual and primitive to human beings and so are our reactions to it (p. 43). Through hundreds of interviews with disaster survivors, several researchers describe how, in life-or-death situations, people gain certain powers and lose others. For instance, some survivors report perfect eyesight during the event and have no need to use their prescription glasses. Others have stated that their hearing became extra keen or other senses were heightened.

Still others have reported temporary blindness, loss of bowel and bladder control, and inability to speak. These are all inert survival instincts that have been instilled in us since the beginning of mankind (Ripley, 2008; Gonzales, 2003, 2008).

DeBecker (1997), on the other hand, adds that fear and intuition are inevitably linked within the human psyche. He contends that what people believe they fear is rarely what they actually fear (pp. 281–283). As an example, he uses the analogy that a person falling is not fearful of falling, for that is already happening; what they fear is landing. DeBecker believes that we should embrace fear; first, because whatever we fear is not happening right now (that is a good thing), and second, we can use fear as the subconscious and innate signal that it is, and view it as one which we can act upon (p. 283). DeBecker (1997) also believes that people are experts at predicting violent behavior and risks. He states that humans know when they're in the presence of danger and that their use (or lack of use) of gut feelings result from a cognitive process that utilizes cues and clues that their mind has previously recognized (p. 7). Gonzales (2008) adds that the natural mechanisms that make humans behave the way they do, when coupled with the laws of physics and chemistry, bring about short- and long-term outcomes that we both enjoy and suffer through (p. 16). Gonzales further suggests that *behavioral scripts* or *mental models* may keep our mind closed. The familiar may lead us to perceive something as being familiar even though we have never come across it before. These scripts will then allow us to “ignore or discount new information” (2008, p. 27).

So, if fear and mind scripts are all part of the human condition, how can we use them to help us survive? Ripley (2008) introduces a concept she calls the “*Survival Arc*”. This arc of human behavior is guided by fear. It is comprised of three separate stages: Denial (or disbelief), which Ripley contends is the most hideous of responses (p. 21); Deliberation (often accompanied by lethargy), which is greatly influenced by the group(s) that an individual associates with and dramatically influences his or her chance for survival; and the Decision (or Ah-Ha! moment), which forces humans into action, much the same as the fight-or-flight syndrome (p. 7). Similarly, Gonzales (2003) writes about phases experienced by people who are lost in the wilderness; (a) denial, (b) realization (with an accompanying frantic, unproductive urgency), (c) chemical emotion (the

forming of familiar and comforting mental maps), (d) deterioration (both rationally and emotionally), and finally (e) resignation–survival then requires the new formation of mental maps of how things really are in the present. Gonzales writes that to survive, “you must find yourself. Then it won’t matter where you are” (p. 157).

Additionally, the National Institute of Standards and Technology (NIST, 2009) found that in building fires, the phases and factors that influence actions are specific to individual occupants within the building, the building structure and design layout, and the fire event with its associated toxic smoke and heat travel. NIST lists four phases of perception and action that influence behavioral processes in occupants (see Figure 3). *Phase 1*, the perception phase, occurs when building occupants can perceive (or receive) external physical and social cues from their environment, including such physical cues as flames, smoke, or debris, and such social cues as hearing discussion, seeing others’ action or inaction, or receiving phone calls from outside the building. During this phase, occupants can perceive more complex conditions and states, such as uncertainty, information overload, time pressure, and even their own thoughts or memories from past events. In *Phase 2*, the occupants attempt to interpret the information provided by the cues perceived during the previous phase. During this interpretation phase, occupants interpret or define both the situation (e.g., it is a false alarm or a serious fire) and the risk to themselves and/or to others. *Phase 3* involves occupants making decisions on what to do next based on their interpretations of the situations and risks confronting them. And, finally, in *Phase 4*, occupants *may* perform the action that they decided upon in the previous decision-making phase (p. 6).

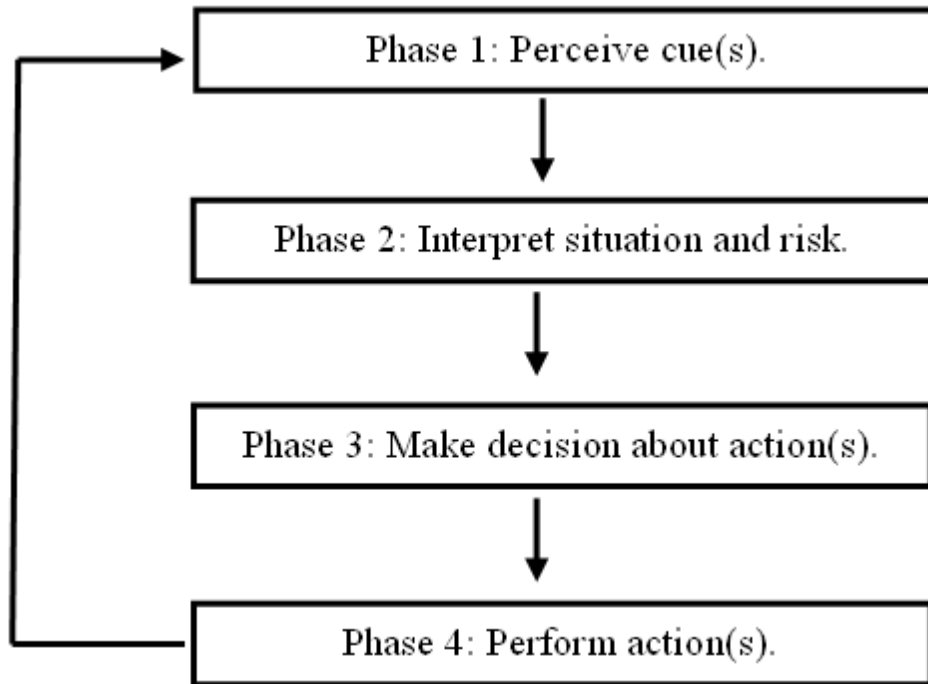


Figure 3. The Behavioral Process of Occupant Response in a Building Fire

Ripley’s Survival Arc, and Gonzales’ five general stages of being lost appear to be derived directly from the five stages of dying as described by Elizabeth Kubler-Ross (1969) in *“On Death and Dying”*: denial–anger–bargaining–depression–and acceptance. However, the less obvious relationship—which is vital to this research—and one sustained by the NIST’s four phases of behavioral processes, is that—many times during fires, emergencies, and disasters—the results are often the same.

2. Emotions Versus Reason

Ripley (2008) states that according to her research, generally in emergency situations, “human emotions trump reason” (p. 59). DeBecker (1997) agrees by writing that animals rely on intuition because, unlike humans, they lack the ability to reason. Animals do not get distracted as people do. They do not consider the way things could be, used to be, or should be; they perceive only what is now. Animals in the wild that are overcome with fear never spend mental energy or time thinking, “it’s probably nothing,” as people do (p. 30).

Ripley (2008) points out that the fallible hierarchy of fear is shaped like a triangle. At the apex of that triangle are over-confidence and underestimation of the risks at hand (p. 43). DeBecker (1997) counters that fear is different from panic, worry, or anxiety. Real fear, he says, initiates action (p. 285). Fear does not give action (or reaction) a second thought. Panic, worry and anxiety make us pause and think rather than react and that can be deadly. He claims, however, that panic, worry, and anxiety are a choice (p. 285), and that anytime a dreaded outcome cannot be linked in our mind to pain or death, and that link is not a signal of the presence of danger, then it really shouldn't be confused with fear (p. 285). DeBecker continues that worry is a fear humans manufacture and that anxiety is always caused by uncertainty and/or lack of communication (p. 291).

Comparing panic and fear requires that we first differentiate the two. In 1981, Paulsen set out to do just that. He offers that panic has been used more than any other word to describe human behavior in fires (p. 10). Paulsen states that panic has been used to refer to actions that might be labeled operationally as “maladaptive or adaptive, rational or irrational,” depending on the outcome of the actions of those who survive a disaster (p. 11). He further argues that behavioral scientists have taken an unscientific word like panic and attached operational definitions to it (as described above). However, these actions or reactions are highly subjective. What may seem as irrational to an outside observer may actually be rational in the eyes of the participant. Paulsen offers this example: “Movement within a burning building against the press of an exiting crowd by a parent attempting to find a child is adaptive from the parent’s viewpoint, but maladaptive for the group of people trying to get out” (p. 11).

Although panic has proved to be a poorly understood and an often overused word when it comes to describing human behavior in emergencies, fear, and its subsequent effects on individual human behavior, may be a much more definitive term. Although fear has several derivatives, it may also prove to offer more predictable human outcomes.

Thus far in our analysis, we have seen that mindfulness—a fully present and heightened state of self-awareness (George, 2010)—contributes greatly to survival in emergencies and disasters. Next, we will relate mindfulness and intuition to individual and group survival.

C. INDIVIDUAL VERSUS GROUP SURVIVAL

Keating and Loftus (1981) contend that fire deaths are usually seen as failures (usually on the part of individuals or systems) that threaten the predictability of our world (fires seem to appear out of nowhere). The impact is that we tend to dismiss accidental fire deaths as the victim's fault (i.e., "they panicked"). It would appear from this vantage point that panic as a behavior may be an assumption, not a condition to be defined or one able to be verified. Panic may not necessarily preclude a person from taking appropriate life-saving actions in a given emergency. Fear, on the other hand, may be more measurable and therefore more accountable for human reaction or inaction during emergencies. In fact, this literature review has found that panic is very rarely seen in emergency scenarios and will be discussed under group actions.

In his dissertation on human and social behaviors in emergencies, Pan (2006) contends that individual decision-making processes in emergencies are based on: *instinct*, *experience*, and *bounded rationality* (p. 25). He equates the fight-or-flight syndrome to fear based on an individual's perception of extreme life-threatening situations. He also discusses that following experience is usually straightforward as humans can recognize a situation, retrieve routines in their memory and carry out those routines to what they believe will be a satisfactory conclusion (p. 26). Bounded rationality includes searching for possible answers, anticipating consequences, weighing each consequence against the other options, and finally choosing the most favorable option (p. 26). Likewise, these techniques of mindfulness can be used in the business world and the high-stakes world of emergency services (George, 2010).

1. Intuition, Business Moguls and Firefighting Commanders

Breen (2000) on trusting instincts states: "One of the prime tools in rapid decision making is mental simulation—the ability to evaluate a course of action by imagining how it may unfold and may ultimately play out" (p. 295). According to Breen, when it comes to making decisions and intuition in business you must trust your instincts. Similarly, Campbell (2000) writes that intuition is a tool that we all have, and if nurtured, intuition and gut feelings can boost sales, close deals, and make better hiring decisions.

Confidence in one's intuitive abilities is especially important when a decision must be made under deadlines without necessary facts (Campbell, 2000). Similarly, George (2010) on discussing Mindful Leadership describes mindfulness as:

...a state of being fully present, aware of oneself and other people, and sensitive to one's reactions to stressful situations. Leaders who are mindful tend to be more effective in understanding and relating to others, and motivating them toward shared goals. Hence, they become more effective in leadership roles. (p. 2)

In his book *Sources of Power: How People Make Decisions*, Klein (1999), after a decade of following firefighters, military personnel, paramedics, doctors, nurses, and even chess champions in *blitz* games—defined as “a type of chess game where each side has significantly less time to make their moves [minutes] than in normal tournament time [hours]” (“Fast Chess,” 2009)—has scientifically documented how people make choices under severe time constraints, with limited information and constantly changing goals.

2. Chess Problem Solving

Problem solving in chess was an interesting, non-emergent comparison form of decision making found during the research. It was discovered that master chess players utilize heuristics, experience, and sometimes a “sixth sense” (or intuition) to beat their opponents (Grey, 2008). Because chess is arguably our most complex of human games (A. Moghaddam, personal communication, January 17, 2013) the decision-making process it requires is worth exploring. Rather than comparing the standard chess tournament time controls—where players have between 60 and 150 minutes per game (Fédération internationale des échecs [FIDE], 1990)—this research will concentrate on the *blitz* (or Fast, Lightning) games of chess due to the added stressors of limited time constraints in which players must make their moves quickly with only three to five minutes per play (“Fast Chess,” 2009).

According to Grey (2008), the psychological strategy to winning in a blitz chess game is based on the fact that statistically, the game ends not by one of the sides checkmating, but rather by one of the players running out of time. Therefore, the main objective in a blitz chess game is to make the opponent lose valuable time *thinking* of the

next move, rather than gaining the upper hand on the board. In this blitz chess scenario, time pressure is an advantage, and not an obstacle. Of course, that is contrary to the case for humans in most emergencies and disasters.

3. Complicate Rather Than Simplify?

In his chess blog, Grey (2008) writes that most beginner blitz players try to swap out as many pieces as possible, thus clearing the board and simplifying the situation and the thinking process (for themselves). In addition, a swap is an easy move to spot, and the decision can be made extremely fast. However, more experienced players would rather make obscure moves, rather than taking this more simplistic approach. The obscure moves tend to complicate the situation and force the opponent to think of an original move, rather than a fast, reactive one. When a player threatens to capture an opponent's piece, even when it is easily defended, the opponent must waste time to think of ways to protect it, thus losing precious seconds, possibly running out of time, and thereby losing the match. A threat to capture an opponent's piece is both a simple move that does not require much thought, and an aggressive move that pressures the opponent to think (Grey, 2008).

This is where the merging of blitz-style chess and this thesis applies. If the emergency and/or disaster can be thought of as the *obscure* player in the above blitz chess game, the extreme situation it presents oftentimes forces most people to stop and think (or come up with) an original move to save themselves. Conversely, if the individual facing the emergency or disaster can eliminate as many complications as possible (e.g., knowing where the emergency exits are, having an evacuation kit, familiarization with or having an emergency action plan in place, etc.) he or she will tend to "simplify" the situation and make quicker decisions. Thus, allowing more time to take action and win the ultimate "blitz" game of survival.

4. Intuition Versus the Sixth Sense

Intuition, says Klein (1999), is the driving force behind the ability to make decisions. Fire commanders use the same tactic. Instead of weighing many options, they make instinctive decisions and then compare them with alternatives. Klein also found that

once recognized, intuition can be developed and utilized to its fullest extent. While most decision-makers liken this to a “sixth sense” or “extrasensory perception” (ESP) (p. 37), Klein’s hypothesis suggests that it is just intuition based on a storehouse of experiences in the brain. Over time, both firefighters and civilians are able to subconsciously categorize fires and life lessons according to how they should react to them. Firefighters create one mental catalog that calls for a search for life and rescue, and another for fires that require an interior or exterior attack. Civilians do the same when they are driving their car and an object appears in front of them. Then both race through their memories in a “hyper-drive” (p. 261) search to find a prototypical fire or past experiences that resemble the fire or object they are currently facing. As soon as they recognize the right match, they swing into action (Klein, 1999).

5. The Corporate World

In the business world, Breen (2000) sees corporations that teach decision-making skills by insisting that their employees generate large lists of options may actually be slowing down the decision-making process. Klein (1999) refers to this as “analysis by paralysis” (p. 259). Newer employees may need to follow such a course of action because they need a framework to help them think through given issues. However, to get them past the beginner stage, organizations must “accelerate the growth of their experiences, so that they can rapidly accumulate the memories and cues that will enable them to make faster, better decisions” (Breen, 2000, p. 294). Breen suggests, “the more you know the faster you go” (p. 294) and therefore corporations offering newer employees mental simulations of problems that have occurred or may occur will help them develop rapid assessment skills. The faster an employee can compare different approaches and options, the faster they will be at solving problems. Senior employees, according to Breen, can move faster because they look at an issue, develop a plan, rapidly assess its feasibility based on past issues, and move on. They do not need to compare and contrast different approaches (Breen, 2000).

6. Emergency Services Versus the Corporate World

The same holds true in the fire and emergency services, which rely on drills (performing tasks repetitiously), post-emergency critiques, and storytelling to assist newer members to grow in the decision-making process, thus providing them with more stored cognitive information than they have in actual experience (Klein, 1999). Therefore, the insights as presented by Breen (2000) and Campbell (2000) for the business community are also applicable to firefighters in risk-versus-reward analysis and the decisive actions required to save lives during structural fires, and civilians who must make quick decisions while driving a vehicle, for example.

7. Rate the Options

Klein (1999) describes a classic decision-making model where practitioners “identify options, compile and compare them, evaluate them, rate them, and then pick the option with the highest rating” (p. 4). With fire commanders, Klein concludes that time pressure simply doesn’t allow for application of this classic model. Split-second decision-makers, according to Klein, are more likely to come up with one course of action (based on past experiences), and run through it mentally to look for flaws. If no flaws are found, they take decisive action. If they do find flaws, they come up with another possible course of action. However, they never compare the two options: “They simply don’t have the time or the energy” (p. 14).

Klein calls this the Recognition Primed Decision (RPD) making model (pp. 24–25). In essence, fire commanders compare quickly (and often unconsciously) the situation they’re in with information stored in their mind—as a pseudo file drawer, Rolodex, or catalog system. They can then recognize features that are analogous to, or different from, these earlier experiences. This allows fire commanders to form accurate mental models and intuitive courses of action. Because of this, experience is extremely important in the split-second decision-making process. If one does not have the experience to fall back, one is more likely to follow the traditional and more time-consuming decision-making, model-gathering data and options, and comparing them (Klein, 1999). This would also apply to civilians driving their private vehicle.

8. How Do They Do It?

Klein emphasizes that when asking decision makers how they did it, most answered that they simply drew from their experiences. However, he finds that experience is not a satisfactory answer. Revealing that battle-tested decision-makers are unable to explain how they make decisions, Klein states: “Their minds move so rapidly when they make high-pressure decisions, they can’t articulate how they did it. They can see what’s going on in front of them, but not behind them” (p. 90). Klein concluded that pressure-sensitive decision-makers, when confronted with a situation, often ask themselves, “What do I do,” not “What’s going on” (p. 127). Their experience buys them time—the ability to size up almost any given situation and to recognize the best course of action—rather than ESP.

Klein feels that fire commanders who withdraw their troops just before a sudden and catastrophic structural collapse simply use “SP”—the sensory perception that detected subtle differences in details compared with other fires in the commander’s mind. Ultimately, according to Klein, “intuition is all about perception” and “the formal rules of decision making are almost incidental” (p. 93). He further believes that if everything works out OK, then fire commanders stick with their choice. However, if they discover unintended consequences that could get them in trouble, they discard that solution and look for another. They might run through several choices, but they never compare one option with another. They rapidly evaluate each choice on its own merits, even if they cycle through several possibilities. Fire commanders do not need the best solution or plan; they just need one that works (Klein, 1999).

As previously cited in this thesis, other researchers do not feel that intuition is a practical or dependable way of making decisions for civilians in life-and-death emergencies because it may take them too long to take necessary action (Ripley, 2008; Gonzales, 2003, 2008; DeBecker, 1997). Learned behavior, as argued by this thesis, is a more reliable option in making better life-saving decisions.

9. Group Survival

When it comes to group behavior and survival in emergencies, Pan (2006) refers to a term called “Social Inhibition” (p. 30). This phenomenon occurs when individuals first turn to each other for social cues and clues rather than taking definitive action. Pan states it is the fear of appearing foolishly hyper-excited over an event that may not be an emergency. The outcome, according to Pan, is the opposite of panic. Individuals within the group maintain a calm outward appearance while looking and judging others’ reactions. Leaders usually emerge, calling for action and others generally will fall in behind and follow as long as the leader remains calm and focused (p. 30).

10. Failure Is Not an Option, Is It?

According to DeBecker (1997) people are much more open to every cue and clue when they don’t focus on the expectation of specific (fear) signals received. Fear tends to make us hyper-alert, which usually decreases the likelihood of perceiving a hazard and thus reduces safety (p. 279). Gonzales writes that group think often leads us into a false sense of reality. He cites the Apollo 13 space mission, as well as the Challenger and Columbia space shuttle missions, as times where NASA’s group think mentality of “Failure is not an option” made personnel blind toward possible errors and acts of omission and commission that ended two of those three missions in disaster. Failure is always an option and humans must remain vigilant to stave off complacency.

11. U.S. Versus U.K.

Another aspect of group think/group survival is the classic myth that “people exit structures immediately when they hear a fire alarm” (Winerman, 2004, p. 1). It has been this researcher’s professional experience that Europeans tend to take fire alarms much more seriously than Americans do. Americans tend to want to define a situation before they respond to it. They will wait for more cues—such as the smell of smoke or a co-worker urging them to leave—before they decide to take action. Perhaps this is due to the history of fires and manmade disasters (wars) suffered by the Europeans, particularly during World War II. Or, it may be a reaction to the numerous television and media ad campaigns over the years to educate the public as to what actions they should undertake

during an emergency, especially a fire. One of the most recognized ones can be seen at: http://youtube.com/watch?v=V5X-mO_WRkU.v Government websites provide information on a host of disaster preparedness situations, such as the U.K.'s: <http://www.direct.gov.uk/en/HomeandCommunity/InYourHome/FireSafety/index.htm> and <http://www.communities.gov.uk/fire/>. Additionally, the U.K.'s Civil Contingencies Act of 2004 requires that the public be informed about different types of emergency situations. Since the 1980s, the U.K. fire service has embraced public education focusing on schoolchildren. And finally, the coordinated and organized response by the U.K. fire service, local and national governments all sending out the same messages goes a long way in helping to educate the public (C. Hawksell, personal communication, August 31, 2012).

Winerman (2004) debunks several myths regarding group evacuation and survival in her research, namely that people generally do not panic in emergencies, people are more often than not altruistic (helping strangers or those less able to help themselves), most people will attempt to exit through the same door they entered (usually because they have not identified other exits), people will move through smoke when necessary, and people are inertia creatures (they do not like to stop what they are doing and drop their everyday tasks to react or even acknowledge an emergency that can be distracting or an inconvenience) (pp. 1–2).

12. Time To React

A good example presented by Ripley (2008) is the May 1960 earthquake—the largest ever recorded in history—that occurred off the coast of Chile killing 2,230–6,000 people. Hawaii's automated tsunami sirens sounded 10 hours before the island was hit. The technology and plan worked, yet 64 Hawaiians perished. Most people who heard the sirens did not know what they meant and waited for more information and clues from their neighbors and relatives rather than evacuating. In March 2011, a similar yet much less powerful tsunami struck Hawaii after an earthquake in Japan. The waves only reached heights of 39 inches. However, the revised evacuation plan and warnings were taken seriously along the island chain's coast, and there were no fatalities as citizens

immediately fled to higher ground. Additionally, a study conducted by the NIST (2002) concluded that on September 11, 2001, survivors waited on average six minutes before they began evacuating the World Trade Center (WTC). Internationally, building architects and engineers were astounded that the estimated 17,410 people who evacuated the WTC took about one minute per floor to climb down (that's the same estimation they used for firefighters—carrying over 215 lbs. of gear—would take to climb up), which was twice as long as predicted and adopted in the standard building codes of that time.

Likewise, a study of occupant behavior during a high-rise office building fire (NIST, 2010) found that the actions of occupants (e.g., waiting for information, helping others, and evacuation preparation actions) were main factors that significantly increased pre-evacuation times (p. 2). Additionally, the NIST research determined that certain actions (e.g., searching for information and confirming information about an incident) have been linked as ones that actually increase pre-evacuation delays (p. 4). As this literature review discovered in Gonzales (2003, 2008) and Kahneman et al. (1982, 1999), NIST acknowledges that an occupant's perception of risk, a factor that occurs in relation to the incident (identified as an "incident factor"), decreases the occupant's overall pre-evacuation time (p. 4).

The above examples and literature review illustrate how professional architects and engineers, like so many civilians, have no concept of how quickly fires and natural emergencies can progress and how short time is when an urgent need to evacuate or take action is presented.

Gonzales (2008) attempts to describe the actions that keep people from reacting immediately during emergencies. He writes that when people are frightened their emotional systems take over to initiate some form of normalcy or normal behaviors (p. 56). This is reinforced by Ripley (2008) when she describes one particular survivor of the WTC who, on September 11, 2001 cleared off her desk, made no less than five phone calls and packed her personal things before being chided by a co-worker to leave the building. This particular individual had survived the 1993 bombings of the WTC (pp. 9–11). DeBecker (1997) describes human high-stakes predictions as using perceived alternatives, perceived consequences, and perceived abilities. These predictions are based

on the individual's measurability (of a threat), vantage point (based on known or unknown information), imminence, context, pre-incident indicators (such as pre-incident fire and evacuation drills, or lack thereof), personal experiences, comparable events (not necessarily identical), objectivity (can that person allow themselves to believe the possible outcomes), investment (in the outcome), and replicability (to their knowledge has this ever occurred before) (pp. 94–95, 97–100).

Crowds often make us callous in emergencies. According to Sommers (2011), group think may render all of us less likely to take action and inject ourselves into the affairs of others when we're surrounded by others (p. 1). He offers several explanations for this: (a) We're less likely to interpret the events as an emergency, (b) when we are unsure of events we tend to look at those around us to gauge their reactions—if they're calm we're more likely to keep to ourselves, and (c) having other people around lets us rest on the assumption that someone else will take care of it (or call for help, etc.). Sommers calls this “diffusion of responsibility” (p. 20).

Therefore, if we can understand the influences that directly affect humans in both individual and group settings during emergencies, we may begin to organize and develop recommendations to reduce human fatalities.

D. WHAT WE CAN DO ABOUT IT

It has been demonstrated that successful response to emergency situations is a combination of learned behavior, prior planning, appropriate occupant behavior, and properly and effectively installed protection, detection, and security systems. Of these three elements, occupant behavior usually has the most significant impact on an individual's survival, where planning and installed protection systems have the greatest impact on group survival (Schroll, 2002, p. 53). This literature review has found that aside from fire protection and security systems, to help survivability during disasters and emergencies humans must rely on themselves. Post-September 11th renewal of survival interest theories and investigation (after being previously all but shut down due to lack of funding in the 1980s) is a testament to the importance of such work. As shown throughout this literature review research has debunked many of the myths associated

with civilian survival (e.g., people being incapacitated due to panic, that they will evacuate immediately, and chaos will result in disorderly evacuations, etc.). Debunking those myths have helped rewrite building codes and architectural and emergency response and management design throughout the United States.

1. Time to Invest

In an interview on social impact and how social research can help assist emergency planners, Pittman (2012) interviews Ms. Kathleen Tierney, director of the National Hazards Center at the University of Colorado. Discussing the multitude of preparedness research, Tierney states how social research has found that “being better prepared is associated with having higher levels of income, homeownership, to some extent with having previous disaster experience, and having children in the home” (p. 41). She explains that all of these factors are sociological and can help explain reasons why some people are more prepared than others. One of the most surprising findings in Tierney’s emergency preparedness research is that the way most people think about disaster behavior and preparedness (such as the sense of pro-social behaviors where neighbors look out for each other pre- and post-event) runs contrary to common sense. Discussing emergency agency outreach, Tierney states that perhaps we have spent enough money on specialized equipment, uniforms, Hazmat suits, and mobile command posts, and now that everyone has all that they will ever need, we should begin to concentrate and invest more on community outreach and education. Particularly to organizations who serve our most vulnerable populations (p. 42).

E. CONCLUSION

Concluding this literature review, Ripley (2008) offers several survival tactics: Building disaster skills, which are our ability to do something automatically that is programmed subconsciously by practice (referring to emergency action plans); erasing fear of liability on the part of government employees (based on ignorance) when it comes to enacting tougher laws requiring evacuation drills and written emergency plans, because those employees are in most cases protected from lawsuits (p. 212); re-evaluate reforms that focus solely on technological fixes and experts, by enlisting and educating

regular people and making them responsible for their own safety and survival decisions (p. 211); repeatedly rehearsing emergency scenarios, which is the best way to make our brains perform under actual high-stress events; and giving people directions, but if none is forthcoming they should have already been given the tools to take their own actions (p. 131). These suggestions mirror Gonzales' training scripts concept, which if not practiced can actually make us overreact and cause more harm than good (2008, p. 44). Sommers (2011) concludes that learning how the presence of others may influence our behaviors by promoting apathy can lead us to be uncomfortable with our own inaction (p. 2). In addition, DeBecker (1997) concludes that taking precautions is constructive while living in fear is destructive (p. 281).

According to Ripley (2008), since September 11, 2001, the U.S. government has dispersed over \$23 billion to individual states and cities in the name of homeland security. However, almost none of that money has gone towards intelligently recruiting the general public into taking responsibility for their own survival (p. xiii); the vast majority of the public is simply not educated enough on what to do when disaster strikes. We must empower ourselves and each other to take precautions, to be prepared and to not live in fear. The literature suggests that, in contrast to Paulsen's report (1981) and similar studies throughout the 1970s and 1980s, human behavior can in fact be predictable and therefore molded. The literature reviewed above discusses that although intuition can generally not be taught (due to its natural, inherent trait in humans and animals alike), *how* humans tend to dwell and rely on intuition can be. Additionally, according to the literature, intuition, if acted on alone, is unreliable. However, when intuition is acknowledged, and taken together with available cues, people will allow themselves to make faster and better survival decisions. This learned behavior will help people resist the natural urge to overthink the situation or expect that everything is "normal" or always going to be OK.

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IV. METHODS AND PROCEDURE

The purpose of this thesis is to examine and reveal the nature and role of human thought processes and actions during emergencies and disasters, and on this basis to put forward recommendations that may help reduce fatalities during emergencies and disasters. The literature review has found an abundance of material available to address the topic. Heuristics (science of trial and error); utility theory (methodical evaluation of alternative choices); human reactions, such as fear, intuition, emotion, and past experience; and group versus individual dynamics each impact the decision-making process, and if people can change the way they think, act, and problem solve during emergencies, they could improve their chances of survival (Kahneman et al., 1982). The research conducted for this thesis has strived to understand how and why people behave the way they do, and how they ultimately make decisions, perform, and react during emergencies.

A. METHODS

1. Sample and Data Collection

Several methodologies were applied as part of this research. Those methods include:

2. Case Studies

General snapshots of actual published events, and human reactions to them, were captured from the literature review and compiled to examine and analyze the presented data to help answer the research questions. In particular, the actions of individuals, as well as the interactions of groups, were examined to exemplify trends, strengths, and weaknesses of human reaction and decision-making processes during emergencies and disasters.

3. Policy Analysis

Policy Analysis was also applied to assist in presenting varying solutions. Formalized and documented policies, such as building evacuations plans, engineering formulas, and so forth, were examined to assist in determining how effective and realistic those policies are.

It has been theorized that people choose alternative actions based on given scenarios they are confronted with and the informational cues that they receive. When people are able to add and compare that information to formal training received, or life experiences they have had instilled internally, they may be in a better position to make sound decisions.

4. Grounded Theory

Grounded Theory was considered for application to this thesis to establish sets of criteria, such as rules and procedures, to judge if outcomes of human behavior can be manipulated, and/or if human behaviors can be expanded to increase the likelihood that decision making can be improved and survivability increased. However, it was discovered early on that the use of this methodology would be of limited use due to time constraints and the inability to apply and evaluate the research recommendations prior to the thesis deadline.

5. Data Analysis

The descriptive research methodology, sampling and data collection and analysis were used to answer the following questions: 1. What research has been previously performed to examine civilian survivability? 2. What are the cognitive functions that allow or prohibit people in making correct life-saving decisions? 3. Are there patterns in the way that people process information and perceive danger? 4. What are the critical elements that allow some people to survive, while others in the same situation perish? 5. What can be done to increase the chances that civilians will make the correct choice of action during emergencies and disasters?

The descriptive research methodology helped reach the conclusions of the thesis by identifying existing sets of human reactions and decision making and their limits. Once the decision limitations are identified, steps can be taken or recommended to overcome them and to establish realistic alternatives that individuals and/or groups can successfully apply to various situations. These conclusions and recommendations will prove valuable to the ongoing discussion of successful human decision making.

B. HYPOTHESIS

1. The Thinker's Toolkit

While a master's student at the Naval Postgraduate School's (NPS's) Center for Homeland Defense and Security in Monterey, CA, the author attended a research colloquium (March 2012). Where the students were challenged to develop a hypothesis for their thesis utilizing techniques found in *The Thinker's Toolkit* (Jones, 1998). The author of this research focused on Part Two of the book and Jones' "Fourteen Tools" for problem solving as a step toward narrowing the potentially broad thesis topic. While considering the "Fourteen Tools" it became clearly evident that the thesis topic narrowed the prospects down to three of the Fourteen. They were: Hypothesis Testing, Devil's Advocacy and the Utility Tree techniques. Early on it was apparent that the *Devil's Advocacy* tool incorporates the *Hypothesis Testing* model; thus, the choices were actually narrowed down to just the two remaining choices.

2. The Utility Tree Model

The Utility Tree model is intriguing as it focuses on the end user's self-interest. In my thesis, that self-interest (utility) for civilians would equal their presumed goal of wanting to survive emergencies and disasters. One of our "defense" strategies is to deny danger to ourselves. For example, "just world theory" proposes that we interpret the world as fair, and as a place where bad things only happen to bad people (Lerner, 1980). Consequently, we go about our daily lives, denying the dangers that might lie ahead.

It is self-evident that a common theme amongst all of the almost 3,000 victims at the World Trade Center on September 11, 2001, was that they went to work that day, as far as we know, still believing that disasters would not happen to them or affect their daily lives. To arrive at a conclusion using the Utility Tree analysis, I would need to answer three questions for the general public posed by Jones: (a) The Utility Question—Will an emergency happen to me today and, if it does, will I live or die? (b) Probability Question—What are the chances of an emergency happening to me today? And (c) Expected Value—If I am aware that emergencies do and can happen to me and I am trained to be aware of my surroundings and the possible outcomes, will I know what to do and be confident that I will be able to make correct decisions? According to Jones, the outcomes of these options must be exclusive and collectively exhaustive (p. 252). Admittedly, it would be impossible to analyze all the possible outcomes. However, the Utility Tree's general technique of questioning was part of this research. This thesis' hypothesis speculates that the general public *can* be taught to make better decisions for their survival (which equates to their self-interest or applicable *utility*).

3. Devil's Advocate

Lastly, the Devil's Advocate technique (which encompasses Hypothesis Testing) has been applied to develop the hypothesis and strengthen the main argument. According to Jones (1998), taking the "devil's position" simply for argument's sake is to challenge the rationale presented on a given topic, the idea being that through this process the truth will stand out and remain intact. The challenge is not due to the disbelief of the challenger, but simply helps test validity. Devil's advocacy works best by seeking, with either the same or other evidence, the opposite of whatever the original view holds. As an analytical tool, it is useful because by design it focuses on a contrary opinion. It views the problem one-dimensionally. It examines alternative solutions and evaluates evidence that supports the opposing view. Additionally, the devil's advocate technique may go further by seeking out and obtaining new evidence. This may open the mind of the original presenter to new dimensions and/or perceptions of the problem. Presumably, the devil's advocate technique pokes holes in false self-serving arguments and strips away thinly reasoned and supported analysis.

Applying the Devil's Advocate technique assisted the author in defending the thesis' central claim (that the general public *can* be trained to make better decisions). By anticipating challenges and being able to respond to them within the research, the author was able to successfully meet the warrant component (Wollman, 2011) of the stated argument. This was accomplished by logically linking the thesis claim with supportive and well-documented reasoning. Presenting the argument in an organized and compelling way, based on what others have published on the subject, will give more credibility to the argument.

The hypothesis and argument of this thesis contends that although research has been conducted to identify how people make decisions—especially in emergencies—none of the research or published literature make any suggestions on how to effectively change negative decision-making outcomes. With a seemingly endless supply of real-life stories as examples, the issue that some people survive based on their styles of thoughts and actions (or inactions) cannot be ignored. After identifying the problem and documenting what others have to say about it, my thesis will attempt to go further and make recommendations for how policy can move forward.

Applying the Devil's Advocate technique allowed this researcher to attack some primary research views that the public cannot be taught to save themselves. It was found that considering counter-point insights helped define the main research question (why do some people live and some people die in the same emergencies and disasters) and the five specific secondary questions. This technique also guided the thesis process in organizing the published works of others to form a conclusion and help solve the research problem (i.e., can civilians be taught to save themselves). Application of the Devil's Advocate techniques produced follow-up questions that may include: How come some people who freeze and take no action still survive? Doesn't luck, fate, or divine intervention help some people to survive? What about people who take action but it turns out to be the wrong action? Hasn't this research been done before? Or, who will read and apply this research?

This technique also allowed the researcher to build a claim that is relevant, specific, and significant. It assisted me in opening my mind to new dimensions of

perception concerning the problem and avoid the possibility of providing self-serving arguments or thinly reasoned and supported analysis. The Recommendations and Conclusion sections of this thesis will solidify the hypothesis as a declarative statement that has not previously tested (Jones, 1998).

C. PROCEDURES

The procedures employed to write this thesis consisted of developing a focused research problem, research purpose, and relevant research questions. An exhaustive literature review was then conducted. Published works and scientific research were gathered along with statistical records used for comparison and contrast. The descriptive research method has been utilized to detail the past and present relationship between civilian survival and fatalities.

1. The Starting Line

The first step of this thesis commenced in January 2012 when the author attended the first of six in-residence programs at the NPS's Center for Homeland Defense and Security Master's Degree Program in Monterey, CA. The collection and reading of literature was begun, as well as an overall organization of the required thesis elements. The development of a personal *Roadmap to Success* (see Appendix B), as well as a *Required Elements and Working Timeline* check-off sheet (see Appendix C) were also drafted at that time. An initial goal of September 1, 2012, was selected as a target date to complete the first thesis draft. Unfortunately, that goal was not realized. Allowing for flexibility with the research flow, a second draft completion goal of October 1, 2012, was established.

Throughout an NPS research and writing course and subsequent research colloquium, a hypothesis, introduction, methods, abstract, and literature review were constructed. Thesis advisors were selected and contacted, and permission to move forward with the project was secured. By March 2012, the executive summary (later to become the "introduction" section) was completed and the final research proposal was

submitted and ultimately approved. A non-NPS affiliated editor's services were also retained and the first drafts of the completed thesis sections were forwarded to the advisors for input commencing on September 5, 2012.

2. Beyond the Fire and Emergency Services

The extension of the literature review beyond the fire and emergency services proved advantageous to the research, particularly when attempting to apply scientific data to civilian fire survivability. However, one limitation of outside sources included the lack of recent studies. The outside perspectives—mostly scientifically based—validated the research purpose and will ultimately assist in answering the research questions. Furthermore, uncovered research concerning psychological do-or-die and intuition-based decision making proved particularly relevant.

The Internet played a vital role throughout this research project. The Internet was used to elicit information, define thesis limitations, and to clarify definitions. Several articles referenced in the literature review were retrieved via the Internet from the Learning Resource Center of the National Emergency Training Center in Emmitsburg, MD, as well as from the World Wide Web.

3. Limitations

General limitations of this thesis include the unfortunate fact that, due to an extensive Institutional Review Board process, scheduling conflicts, and logistical issues, face-to-face interviews could not be conducted to evaluate the realistic potential of civilian survivability. A secondary, general limitation, was the potentially large topic area and the necessity to concentrate on the less broad perspective. Keeping the problem and purpose of the research in focus was a key to overcoming this limitation.

Additionally, it should be noted that a major contribution to the timing and success of this research was the backing up and saving of the different versions of the thesis after each session of work. Although there were some technological glitches along the way, the inevitable setbacks provided a clear value of hand-written documentation,

and hard-copy printing of the report as it progressed, and the backing up of all information to reliable outside sources rather than total reliance on one single electronic hardware source.

4. The Finish Line

The final stages in completing this thesis (December 2012–January 2013) included compiling the materials, organizing the processes involved, and writing the final version with input from the advisors and editor. The formatting, typing, and proofreading of the paper and, the ultimate submission of the completed thesis to the NPS were accomplished well in advance of the final submission deadline (March 29, 2013).

D. CONCLUSION

To study the importance of human thought processes and produce recommendations that may help reduce fatalities during emergencies and disasters, an organized and steadfast approach to the research was required. The methods and procedures as described above allowed the thesis to grow, naturally, as the abundance of published material was examined and the information systematically arranged. The ability to maintain a narrowed focus throughout the process was instrumental. Developing the research questions through several methodologies allowed for an all-encompassing look at the problem and resulted in a concrete rationale to definitively answer the research questions. Additionally, early establishment of a personal roadmap and check-off sheet for the required elements together with timelines for both proved to be crucial to completing the project on time

V. RESULTS

Americans tend to be die-hard optimists, literally. It is part of what makes this country great—and vincible....Ours is a strange culture of irrational distrust—buoyed by irrational optimism. (Ripley, 2006, pp. 3–4)

A. COMMON THEMES

Throughout the literature review and research procedures three common threads consistently emerged: (a) In most emergencies and disasters (but certainly not all), people who survived made a conscious decision to take immediate action; (b) in most instances, survivors had planned ahead or been mentally prepared to deal with emergent circumstances before they occurred, and (c) education in emergency actions and planning, the gathering of information and clear communication all play a vital role in civilian survival. These three common themes directly correlate to the problem, purpose and research questions of this thesis.

The organizational steps of this research were aimed at compiling and examining published literature on human reactions and decision making, and to then compare those with scientific findings on the same topics. The two sets of information were then collated into a singular discussion on the main topic area—why do some people live and others die in the same emergencies and disasters, and can civilians be taught to save themselves?

The reasons for selecting the particular literature and scientific research found within this thesis are the correlations shown between the science of human behavior and the reality of those behaviors in everyday, real-world scenarios. The blending of applied arts (everyday human reactions under extraordinary circumstances) and the sciences (the study of human behavior) has assisted in answering the research questions. To that end, the following results are presented.

B. RESEARCH QUESTIONS

1. Question One

What research has been previously performed to examine civilian survivability?

As exemplified throughout the literature review there are a multitude of nonfiction published works on the topic of survivability and human reaction to emergencies and disasters. Although many of these works are published by non-scientific authors (Campbell, 2000; Connell, 2001; DeBecker, 1997; George, 2010; Gonzales, 2003, 2008; Keating & Loftus, 1981; Klein, 1999; Lerner, 1980; Prince, 1920; Ripley, 2006, 2009; Sommers, 2011; Winerman, 2004), several scientifically based studies and reports were found, viz., Corbitt et al., 1967; Elinder and Erixson, 2012; FDNY, 2012b; Frey et al., 2010; Gershon et al., 2007; Hall, 2011; Kahneman et al., 1974, 1979, 1999; Latane & Darley, 1968; McClennan et al., 2011; NIST, 2002, 2009, 2010; USFA, 2002, 2011b, 2011c, 2012b; Pan, 2006; Paulsen, 1981.

The significance in differentiating between nonfiction authors and scientific studies in this field is that the former tend to document *what* events transpired, *who* was involved, and *how* they handle the given situation. These works also identify problems and issues in decision making that arose from those circumstances as interpreted through the author's opinions. The latter on the other hand, attempt to answer the *why* of these occurrences. They base their findings on science-based studies and validated psychological research. Additionally, the science studies—although certainly written by authors—add validity to the nonfiction works, as well as to the thesis topic.

This research attempts to relate human decision making to the broad spectrum of emergencies and disasters. However, several scientific studies and a plethora of published works—in addition to those in the Literature Review—were found that specifically relate to human reaction during fires. It was found that the results of fire-related fatalities and survival statistics, combined with the significant and detailed reporting of such information, lend themselves to in-depth examination more readily than other types of emergencies and disasters.

a. Fire Data

The data-gathering procedure for this thesis was aided by the official statistics available through government agencies. According to the USFA (2012), the Federal Fire Prevention and Control Act of 1974 authorizes the USFA's National Fire Data Center to gather and analyze information on the magnitude of the nation's fire problem, as well as its detailed characteristics and trends. The Act further authorizes the USFA to develop uniform data-reporting methods, and to encourage and assist state agencies in developing and reporting such data. To carry out the intentions of the Act, the National Fire Data Center has established the National Fire Incident Reporting System (NFIRS).

b. NFIRS

The NFIRS has two objectives: (a) to help state and local governments develop fire reporting and analysis capability for their own use, and (b) to obtain data that can be used to more accurately assess and subsequently combat the fire problem at a national level. To meet these homeland security objectives, the USFA has developed a standard NFIRS package that includes incident and casualty forms, a coding structure for data-processing purposes, manuals, computer software and procedures, documentation, and a National Fire Academy training course for utilizing the system. Currently, all 50 states, the District of Columbia, and 23,000 U.S. fire departments report through NFIRS annually. That statistic accounts for greater than 75% of all reported fires that occur throughout the U.S. (USFA, 2012a).

c. Structural Fire Deaths

The research uncovered that between 2006 and 2010, 75% of all civilian fire fatalities occurred as a result of fires in residential buildings or private homes. The majority of those deaths occurred between the hours of 10 pm and 6 am and accounted for 49% of fatal fires and 51% of fire fatalities (see Figure 4) (USFA, 2011c).

During the same time, span nonresidential structure fires accounted for less than 5% of annual U.S. fire fatalities (USFA, 2012b). Nonresidential structure fires

include: public assembly (eating and drinking establishments), educational facilities, stores, office buildings, basic industry, manufacturing, storage, detached garages, outside properties, other nonpermanent residential buildings (e.g., hotels and motels), and institutional properties, such as prisons, nursing homes, juvenile care facilities, and hospitals (USFA, 2012b).

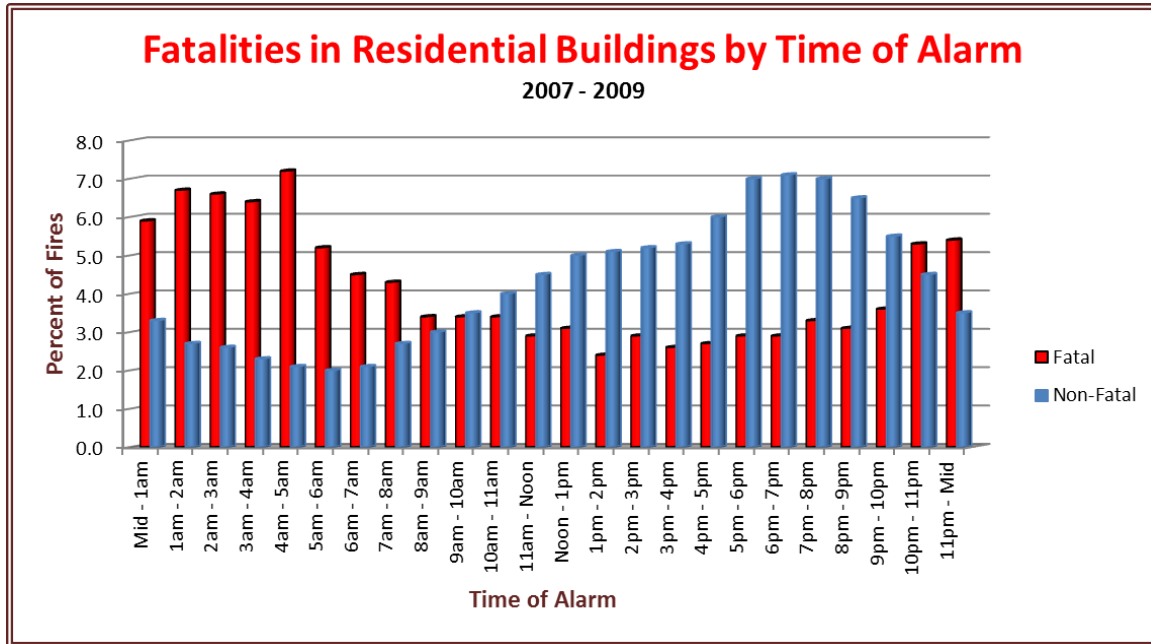


Figure 4. Residential Building Fire Fatalities by Time of Alarm

Conversely, fires that occurred in both residential and nonresidential high-rise structures—defined by the International Building Code and the Building Construction and Safety Code as: “buildings 75 feet or greater in height measured from the lowest level of fire department vehicle access to the floor of the highest occupiable story”(Hall, 2011)—accounted for just over 6% of all fire fatalities. Yet, in the wake of the tragic events of September 11, 2001, high-rise fires and high-rise firefighting tactics have assumed a more prominent role in the consciousness of the U.S. fire service and American society as a whole (USFA, 2002).

(1) Contributing Factors. As depicted in Figure 5, the most notable factors that contributed to fatalities in residential buildings were: (a) the fire progression, (b) egress, and (c) escape problems. Fire progression factors involve

situations where fire exits were blocked by smoke and/or flame and where vision is blocked or impaired by smoke, and civilians are trapped above or below the fire. Egress problems include such factors as crowded situations, limited exits, blocked/locked exits and mechanical obstacles or other problems with the exit. Escape factors include unfamiliarity with exits, excessive travel distances to the nearest exit, choice of inappropriate exit routes, and re-entering the fire structure (USFA, 2011c).

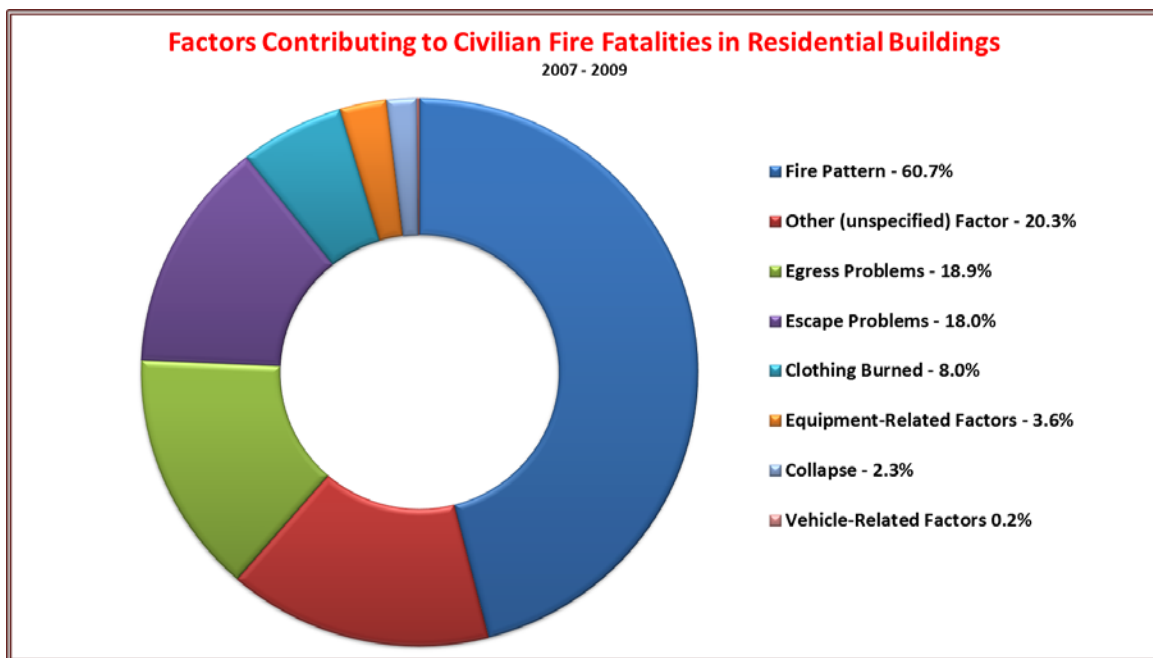


Figure 5. Contributing Factors to Residential Civilian Fire Fatalities

Additional contributing factors were age and the ability to self-evacuate. Figure 6 shows the leading activities during fire fatalities (sleeping and escaping) and compares them with the age groups of those killed. Excluding the age groups of under 10 and over 80 (who presumably may have difficulty removing themselves), the greatest number of fatalities are found to be in the 10 to 79-year range and particularly in the 10- to 69-age range. Presumably, the 10- to 69-range represents those attending full-time educational facilities and/or full-time work locations where emergency preparedness education would prove to be the most beneficial.

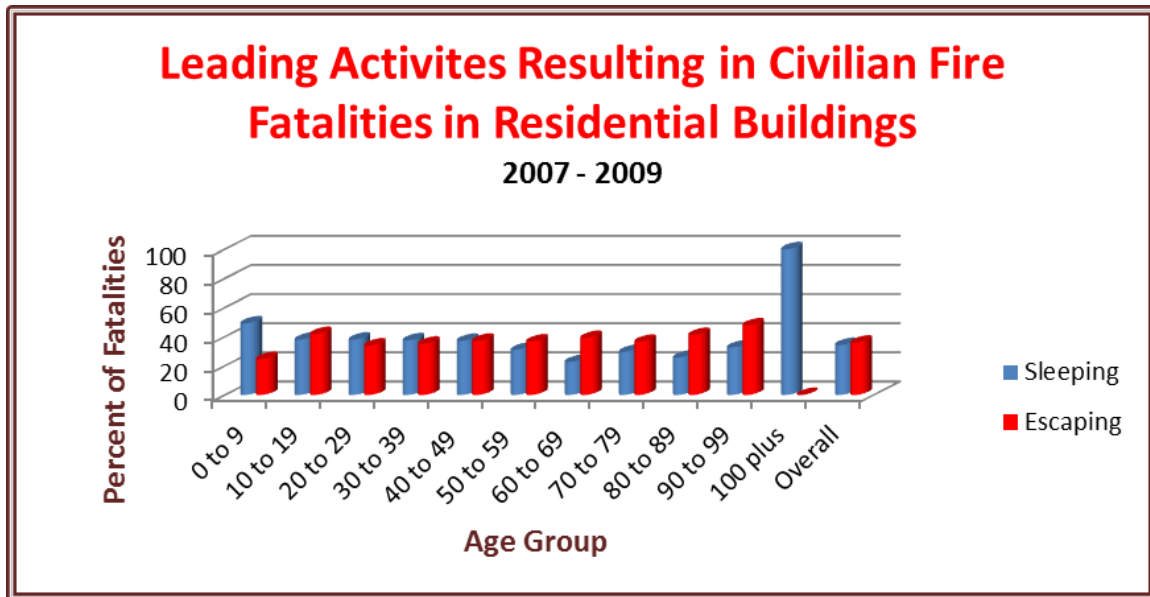


Figure 6. Leading Activities Resulting in Civilian Fire Fatalities

Figure 7 illustrates fire fatalities by age group and gender. Of particular note is that male fatalities regularly out-number female fatalities. The accepted understanding for this dichotomy is that women tend to evacuate earlier than men, or are found attempting to warn/rescue children or older adults. Males, on the other hand, are more often than not found close to the fire origin as they are more likely to attempt to extinguish the fire (McLennan, 2011).

Additionally, males in the age range of 13 to 70 years are particularly vulnerable to fatality in fires. The general understanding for that statistic is that they are most likely to take extinguishment action or attempt to rescue others who may be trapped. Further, the mid- to upper-end of that age range represents homeowners who have been found more determined to defend their property (McLennan, 2011; USFA, 2011c).

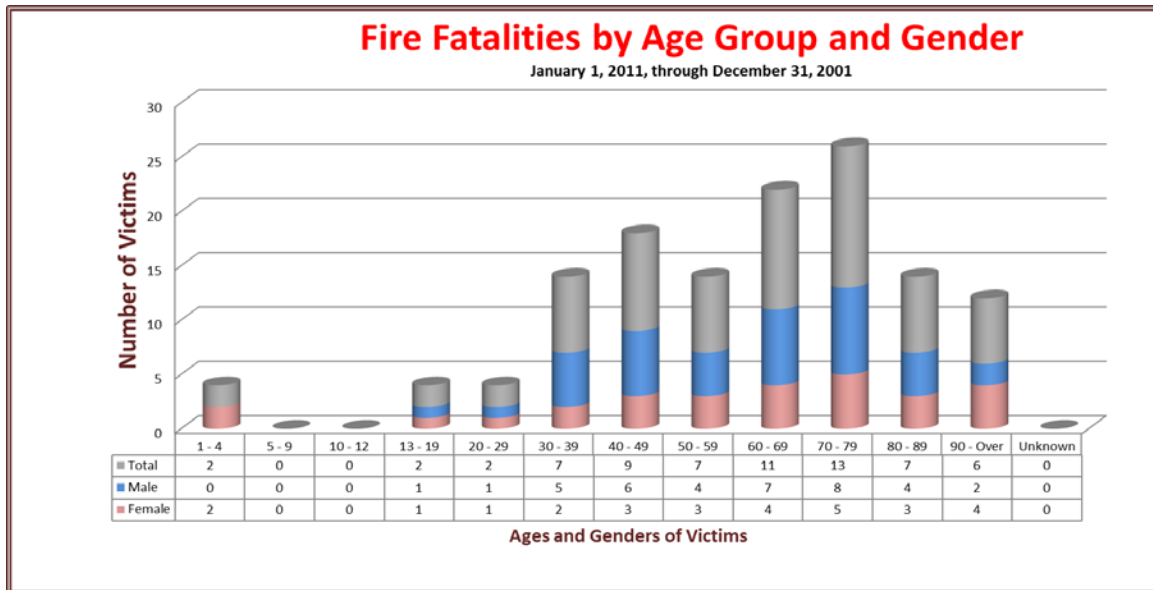


Figure 7. Fire Fatalities by Age and Gender 2001–2011

(2) Activities Prior to Death. Perhaps the most significant finding of this research is the reported activities of civilians prior to death. According to the USFA (2011c) slightly more victims in residential structure fires (35.9%) died attempting to escape while slightly less (34.3%) died in their sleep (see Figure 8). With the notable exceptions of having installed, operational smoke detection systems (to provide early warning of a fire in progress and allow more time for escape) and sprinkler systems (to prevent the growth and spread of a fire), it is the action of escaping and the lack of a preset escape plan and forethought that is the focus of this research.

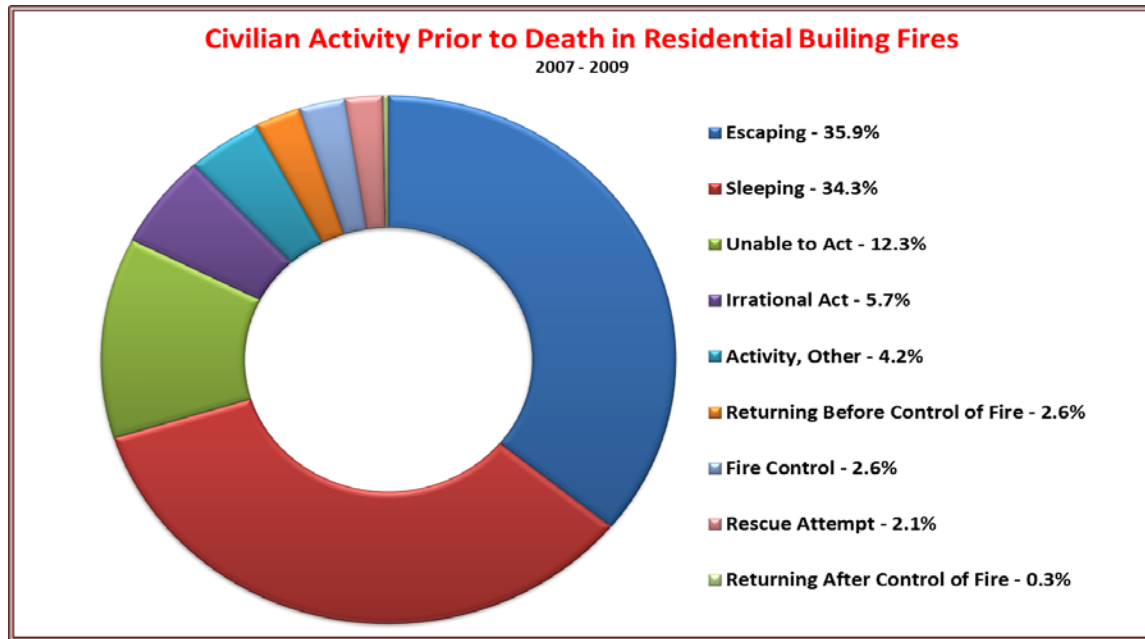


Figure 8. Civilian Activity Prior to Fire-Related Fatalities

Regarding high rise office buildings and civilian behavior, perhaps no greater resource of information is available than that of the September 11, 2001, World Trade Center attacks. In addition to previously cited works of nonfiction authors who conducted interviews with survivors (Gonzales, 2003, 2008; Ripley, 2006, 2008; Sommers, 2011), there are notable in-depth scientific research studies, such as those of the NIST that were, and continue to be, conducted. Additionally, Gershon et al. (2007) highlight the vulnerability of high-rise structures with an emphasis on recent historic bombings, technological and infrastructure failures, and high-rise fires, and the difficulty of mass evacuation from these structures under these extreme conditions.

d. Non-structural Fire Deaths

McLennan et al. (2011) examined the 2009 *Black Saturday* bushfires that occurred in Victoria, Australia. How and why some people survived the extreme conditions (and why some people did not), and what can be done to avoid such devastating events in the future were the context of their analysis. Although 173 people perished in those fires, many (33) survived conditions that were so extreme, they could have easily died. The authors contend that while 30% of the fatalities showed some

evidence of defensive firefighting (including 5% active defense, and 25% some or questionable defense [p. 41]), an additional 26% apparently took a wait-and-see posture before deciding what to do. However, the authors point out that it is unclear as to what triggering mechanism these people might have been waiting for. The remaining plurality were believed to have been sheltering in place without taking any definitive or defensive actions whatsoever. For some of them that may have been part of their emergency plan (p. 41).

Of the 301 fire-impacted survivors, 67% were men and 33% were women. The ages of the survivors ranged from 34 to 68 years. The study found that women were more likely to have evacuated prior to being impacted by the fire, particularly for those who had children. Men, on the other hand, were more likely to choose to stay and defend their property.

e. Non-fire Disasters and Deaths

The research also found human behavior studies that have been conducted for disasters other than structural fires, such as Frey et al. (2010) who studied social norm comparisons between the sinking of the *Titanic* and her sister ship the *Lusitania*. They point out that although the two ships and the composition of their passengers were nearly identical, the behavior of the individuals on board each were dramatically different. On the *Titanic*, for instance, they found that social norms and social class status prevailed, where on the *Lusitania* selfish and “survival of the fittest” behaviors dominated. Conversely, Elinder and Erixson (2012) debunk the long held maritime notions of “women and children first” and “the captain always goes down with the ship.” In fact, after analyzing 18 maritime disasters spanning 300 years, and covering the fate of over 15,000 passengers and crew, they found that: (a) women have a distinct disadvantage of surviving over men, (b) crew members do not necessarily give priority to passengers (they actually survive at significantly higher rates), (c) under maritime law the ship’s captain has the authority to enforce normal behavior, and (d) they conclude that in life-and-death situations the expression “every man for himself” may be a more accurate phrase.

In yet another research report (Brunkard et al., 2008) conducted on deaths in New Orleans during Hurricane Katrina (August 29, 2005), it found that contributing factors leading to many of the deaths were lack of prior planning, information, ability, and transportation. Furthermore, the report cites that the majority of deaths occurred to the elderly and sick or infirmed. The report concludes that this vulnerable population remained in areas that were most susceptible to the severe flooding, because they feared looting, were unable to continue with their daily routines, and/or were not medically capable of leaving.

f. Conclusion

The common themes of both nonfiction literature and study-based scientific means were found that directly correlate to the problem, purpose and research of this thesis. The abundance of detailed previous research has allowed for definitive outcomes to be established, and for significant recommendations to be made.

2. Question Two

What are the cognitive functions that allow or prohibit people in making correct life-saving decisions? It was found that dependent upon if the discussion consisted of group versus individual behavior, the cognitive reactions of people during emergencies and disasters can vary greatly. An unexpected finding was the disagreement in philosophies between Ripley (2008) and DeBecker (1997). Where DeBecker believes we are driven by instinct to make decisions, Ripley feels that evolution can actually impair our cognitive decision-making functions. Due to the fact that human evolution has been outpaced by the rapid and almost instantaneously changing modern society, Ripley argues that instincts are, at best, unreliable.

a. Emotions and Reactions

VonAppen (2010) reveals that emotions, such as fear and anger, can produce overwhelming physical reactions to extreme stress. He found that those who survive make correct decisions by overcoming their emotional response to the environment in which they find themselves. Gonzales (2003) concurs. He adds that

survivors are not immune to fear, but rather, they become keenly aware of their surroundings. And, although these individuals may be scared, it is what they do about it next that may make all the difference.

A number of authors—Breen (2000), Campbell (2000), George (2010), Gonzales (2008), Kahneman and Tversky (1982), Klein (1999), and Pan (2006)—conclude that individuals rely on emotional shortcuts or mental scripts to make themselves feel safe and happy, even though those shortcuts may prove to be delusional and not based on reality. It is that quest to feel safe and secure that causes people to overlook obvious cues, clues, and factors, ultimately creating more uncertainty. That uncertainty thus produces more shortcuts as they spiral towards indecision or maintaining the status quo. Furthermore, relating perception or preconceived notions to a given situation may blind individuals to what is actually occurring. Nassin (2010) agrees that utilizing the same old techniques to solve new, complex challenges in today's world will not work for the majority of individuals who find themselves in emergent circumstances.

Interestingly, it was found that several of the above authors agree that in the work of emergency services and sometimes in the world of business, those same instincts and intuitive skills *are* based on past experience and actually aide the decision-making process. These individuals are capable of isolating their emotions, and compare their instincts with alternatives (based on past experience) before settling on the best possible outcome (Breen, 2000; Campbell, 2000; George, 2010; Klein, 1999). However, in what appeared to be a dissenting view, VonAppen (2010), writing on the cognitive functions of a group of firefighters caught in a life-threatening scenario (of possibly burning to death), proposes that:

Our emotional response will overrule our ability to think in a rational manner. Cognition, the ability to think things through, is at once cast aside in favor of an emotional response. Knowing what we are *supposed* to do is no match for the power of our emotions. (p. 4)

Therefore, according to VonAppen, if the professionally trained firefighters in the above scenario were not able to set aside their emotions to safely remove themselves from this

untenable situation, what chance would untrained civilians have? This was an unexpected finding of the research and one that will be challenged in the discussion section of this thesis.

b. Acknowledging Reality

The majority of the research found that emotions can be held in check if people acknowledge the reality of the world around them, as it exists at that exact time, that is *mindfulness* (George, 2010). The research has determined that definitive action must be a conscious process during emergencies. Intuition and emotion may lead to incorrect choices and irrational behavior; therefore, individuals must make quick decisions based on an acknowledgement of how things are and not what they would like them to be (Gonzales, 2003, 2008; DeBecker, 1997; Gershon et al., 2007; Pan, 2006; Ripley, 2006, 2008; Kahneman et al., 1974, 1979, 1999; Keating & Loftus, 1981).

On group behavior, the research found that Connell (2001) focused his report on the emerging norms in the decision to evacuate in the framework of collective group behavior demonstrated during the terrorist attacks at the World Trade Center (WTC) on September 11, 2001. He concluded three key factors affected the decision to evacuate: (a) social locations within the buildings and respective workspaces, (b) the role of leaders, both formal and informal, and (c) the level of perceived threat. He, like Winerman (2004) found that panic was not widely observed and definitions of previously established norms (panic, self-serving behavior, etc.) were rarely evident.

Likewise, Gershon et al. (2007) and Connell (2001) also analyzed the WTC evacuation and found that group behavior (and organizational behavior) were affected by: (a) preparedness planning, (b) training and education of employees, and (c) risk communications amongst building occupants and work space locations. They also cited leadership as a factor that influenced many in the evacuation. Many evacuees reported that rapid and decisive direction by a person perceived to be an authority figure prompted their evacuation. Several of these leaders were informal. According to the studies of Gershon et al. (2007) and Connell (2001) only a small number of WTC evacuees reported that a work place manager led to the decision to leave or physically led

the evacuation. This is in concurrence to Pan's research (2006) that many individuals do not want to make decisions on their own especially based on limited information. According to Ripley (2008), DeBecker (1997), Gonzales (2003, 2008), Connell (2001) and Gershon et al. (2007) for a large number of workers at the WTC this led to long delays in evacuating.

Likewise, in a study of occupant behavior during a high-rise office building fire NIST (2010) found that evacuation times and the actions of occupants pre-evacuation and during evacuation (e.g., waiting for information, helping others and evacuation preparation) were main factors that significantly increased evacuation times (p. 2). Additionally, the NIST study determined that certain actions (e.g., searching for information and confirming information about an incident) have been identified as ones that actually increased pre-evacuation delays (p. 4).

The research for this thesis also discovered in Gonzales (2003, 2008), Kahneman et al. (1982, 1999), and NIST (2002, 2010) that an occupant's perception of risk, and the acquisition of sensory cues (Gershon et al., 2007) were factors that decrease the occupant's overall pre-evacuation time (NIST, 2010, p. 4).

c. Conclusion

In answering research Question Two, the results show that the cognitive factors of perception, past experiences, planning and training, reliability on instincts, controlling emotions, and focus are all associated with better decision making. Conversely, group mentalities, such as waiting for someone to take charge, information seeking, milling, preparing for evacuation, and assisting others are the cognitive functions that may actually prohibit better decision making during emergencies and disasters.

3. Question Three

Are there patterns in the way people process information and perceive danger? NIST (2009) concluded that there are four phases of human behavioral processes that govern occupant response during fires and emergencies: Phase 1–*Perception*, Phase 2–*Interpretation*, Phase 3–*Decision Making*, and Phase 4–*Action Performance*. These

phases and the factors that influence actions are individual–distinct to the occupants within the building—and are dependent upon such characteristics as: (a) the building and its detection and protection systems, (b) building layout, and (c) the significance of the fire and/or smoke event.

Perception: In this phase, building occupants perceive (or receive) external physical and social cues from their surrounding environment. Such cues may include: experiencing flames, smoke, heat, or debris, and picking up on social cues, such as hearing others’ discussions, witnessing other people’s actions or inactions, and/or receiving phone calls from outside the building. Uncertainty, information overload, time pressure, individual thoughts, and memories from past experiences and education are all considered to be additional “complex conditions or states” (NIST, 2009, p. 6) that may further influence an individual’s behavior.

Interpretation: This phase is where the occupant attempts to analyze the information received during the first phase. *Decision Making:* During this phase, the occupant makes suppositions on what to do next. *Action performance:* In this final phase, the occupant *may* carry out the actions decided upon in the previous phase. As illustrated in Figure 3 the process occurs in a constant continuum as further cues and decision consequences are experienced.

a. Factors of Influence

To account for the possible factors of influence that may affect an occupant’s behavioral processes (Phase 1), research shows that both occupant- and cue-based factors influence whether a person perceives, or is able to perceive (without physical or emotional limitations that would prevent perception), a particular cue.

Occupant-based factors can influence individual perception and receipt of certain cues, such as visual impairments and hearing impairments. Appendix A represents an overview of possible factors for phases 1 and 2 of the behavioral process and its influence over occupant decision making. Based on data and theory from human behaviors in fires, community-wide disasters, and other types of emergencies, the relationship that NIST (2009) attempts to demonstrate is how certain factors either

increase or decrease an occupant's behavior in Phase 1 (Perception), and how that increase or decrease directly correlates to occupant interpretation of events and the occupant's ultimate decision making (Phase 3) and action performance (Phase 4).

The factors of influence (Appendix A) have been categorized into two main types: occupant-based factors and cue-based factors. Occupant-based factors include pre-event items which are those factors possessed by the occupant prior to the event taking place (e.g., education, training, demographics, etc.), and event factors which are possessed by the occupant as a function of the event itself (e.g., not being able to use stairs, etc.). Cue-based factors are inherent to the particular event; they vary in number, complexity, source, or type of cues presented (alarms, smoke, other occupants, and other people's actions).

b. Cues, Clues, and Shortcuts

The 2009 NIST study, *The Process of Human Behavior in Fires*, concludes that behavior during a building fire or emergency is the result of behavioral processes that require further examination. Each of those processes begins with new cues and information from the physical and social environments surrounding the individual occupants. First, cues need to be perceived, then they must be interpreted, and then a decision must be made as to what action (including inaction) is taken. During an evacuation, individuals repeat this process over and over again as they engage in a variety of different activities.

As previously detailed in the "Human Disaster Studies: A Languishing Science" chapter (p. 21) Kahneman and Tversky (1982, 1999) found that human decision-making patterns include applying emotional shortcuts and cognitive intuition first, then searching for information to solidify decisions second. Typically, these scientists found that Heuristics (the use of trial and error) is also a significant, yet untrustworthy form of decision-making patterns.

Gonzales (2008), Pan (2006), and Klein (1999) all cite varying degrees of reliance on human instinct and the use of mental scripts from previous experiences as patterns to human decision-making, although Klein alone describes the success of these

patterns when applied by high-stakes, life-and-death decision makers. Each of the others state that the use of past experience in emergencies and disasters for the lay person is, at best, unreliable.

c. Arcs and Steps

Ripley (2008) and Gonzales (2003) describe more in-depth patterns of decision making. In Ripley's Survival Arc (p. 21) the pattern includes disbelief, deliberation and taking action, where Gonzales' version (2003) includes denial, realization, chemical emotion, deterioration, and resignation. Although similar in approach to human decision-making patterns, they each describe differing variables in greater or lesser detail. Again, the NIST's (2009) four phases of decision making (perception, interpretation, decision making and action performance), appear to add yet additional layers of theory to the way humans approach decision making.

d. Conclusion

On the surface there appears to be little consensus to the multitude of identifiable patterns used by humans to make emergent decisions. However, when initiating side-by-side comparisons, there are certainly re-emerging patterns and/or themes. For instance, when it comes to the general public and how they make decisions intuition, past experience, information gathering, and deliberation more often than not appear as reoccurring memes. Additionally, the human condition complicates these memes due to the fact that in different individuals some of them may occur independently, simultaneously, in short or long succession, and rarely sequentially. Putting aside (for now) the unreliable aspects of using such patterns, identifying the most common forms of human decision-making patterns may allow us to address the faulty processes involved and to emerge with a clearer understanding of how to adapt and overcome these pattern inadequacies.

4. Question 4

What critical elements allow some people to survive and others to die? The majority of the literature reviewed for this thesis claims that education, information, and

practice are the keys to human survival during emergencies and disasters (Campbell, 2000; DeBecker, 1997; Frey et al., 2010; Gonzales, 2003, 2008; Hall, 2011; Kahneman et al., 1982; Keating et al., 1981; Latane et al., 1968; McLennan et al., 2011; NIST, 2009, 2010; Ripley, 2006, 2008; Schroll, 2002; USFA, 2002, 2011b, 2011c; VonAppen, 2012; Winerman, 2004). In an interview on how social research impacts emergency planning, Kathleen Tierney (Pittman, 2012) sums up this sentiment when she states that among growing recognition in the homeland security/emergency management field is that, “while we need expert emergency management—we need well-trained, well-educated people—that the whole community is involved in mitigating, preparing for, responding to, and recovering from, disasters” (p. 41).

According to Michael Byrne, National Incident Management Assistance Team Leader for the Federal Emergency Management Agency (FEMA) (personal communication, November 27, 2012, Hurricane Sandy recovery operations, New York, NY) the *whole community* approach has been and continues to be a major focus of FEMA. It is that important. Although many emergency agencies are also touting this whole-istic-community approach, Tierney laments, “It’s what sociologists have been saying all along” (Pittman, 2012, p. 41).

a. *Why Do Not We Prepare for Disasters?*

In a *Time* magazine article of the same name, Ripley (2006) writes that historically, humans do not get serious about avoiding disasters until after one has just “smacked them across the face” (p. 1). Further, Ripley quotes the former director of the U.S. Natural Hazards Center, Dennis Mileti, as saying, “We know exactly—exactly—where the major disasters will occur.... but individuals under-perceive the risk” (p. 1). George Foresman, Under-Secretary for the Department of Homeland Security from 2005-2007, estimates that less than 20% of monies earmarked for emergency management have gone to disaster planning and training of the public. Additionally, Americans “do not like being told what not to do, says Foresman” (Ripley, 2006). Foresman states that the U.S. Constitution limits the power of the federal government; therefore, it cannot force states, companies, or individual homeowners to act, and when the federal

government tries to demand changes with regulation, state and local officials “bristle at the interference.” He adds, “Like teenagers, we resent paternalism—until we’re in trouble. Then we expect to be taken care of” (Ripley, 2006, p. 6).

b. Critical Example

The research discovered a fitting example that illustrates how things should work: the law that mandates that all cruise ship passengers must receive a safety briefing before the ship leaves port. Similar to the safety briefing given on airplanes prior to take-off, this example addresses perhaps, the most critical of the elements previously identified, that may allow some people to survive and others to perish (viz., information, education, and practice).

The cruise ship instructions go beyond that of the airlines in that they include locating and putting on life jackets, locating and using emergency exits, how to notify the crew, and where to muster in case of emergencies (Topham, 2012). This shining example may set the benchmark for other industries to follow in emergency preparedness.

c. Conclusion

Identifying the critical elements that allow some people to live and some people to die in the same emergencies and disasters at first appeared to be a daunting task. However, to answer this research question, the descriptive research method helped in narrowing the focus. The extensive literature available covering the vast field of disaster survival made it possible to discover that the critical elements were not as overwhelming or as elusive as it might first have appeared. Boiling the identified critical elements down, and separating all the extraneous components into their most basic origin, proved vital in answering this particular research question. The three consistently emerging themes that allow people to make better life-and-death decisions during emergencies and disasters almost exclusively relate to education, information, and application (i.e., practice). The identification of these critical elements will assist in making sound recommendations to help address those recurrent themes.

5. Question 5

What can be done to increase the chances that civilians will make the correct choice of action during emergencies and disasters? “The only thing tougher than planning for a disaster, is explaining why you didn’t” (Dartanner, 2011, p. 1). Educating the public on the importance of planning for emergencies without delay is a mantra for Dartanner. He feels that this liberating experience will help give people a sense of control over their own situations. He also compares disaster planning to a form of insurance where you hope you don’t ever need it, but if you do, it’ll be ready. He discusses how some people who have never been personally affected by a natural disaster often decide (consciously or subconsciously) to not deal with the subject at all, and how that can be a dangerous mistake. He uses the following scenario to make his point:

It’s 2 o’clock in the afternoon and you receive a phone call from “Reverse 911” informing you a fire is headed your way and you should evacuate immediately.

You scoop up the cat and place her in a carrier, snap the dog’s leash on his collar and put both in the car. You then methodically collect the folder containing important papers, the photo album, computer disks, prescription meds, and other items on the “don’t forget to take” list kept on the fridge.

You can feel the tension and anxiety, but you and your family have rehearsed this before, so you feel confident things will be OK. You have cleared flammables away from your home. You know your children’s school and spouse’s work disaster plans. You have your “get away” pack in the car. You know where you will meet with your family. You know several ways out of your neighborhood.

Just as you start to leave, the phone rings. It’s your neighbor. She asks you what you are going to do. She wonders if you think the threat is real and if you have talked to anyone else. She wants to know if you think she should leave. (p. 1)

Dartanner asks, “Why the different reactions to the same phone call?” He relates that you have “trained” your brain to instinctively know what to do by your preparations. Backed up by several other researchers and authors found in the Literature Review (viz. Breen, 2000; Campbell, 2000; DeBecker, 1997; Elinder et al., 2012; Frey et al., 2010; George, 2010; Gonzales, 2003, 2008; Hall, 2011; Jones, 1998; Kahneman et al., 1982, 1999;

Keating et al., 1981; Klein, 1999; Latane et al., 1968; Lerner, 1980; McLennan et al., 2011; NIST, 2009, 2010; Paulsen, 1981; Prince, 1920; Pittman, 2012; Ripley, 2006, 2008; VonAppen, 2012; Winerman, 2004). The common thread is that in emergencies, our instincts can be dangerous. We want to stay put, and we want things to be normal. According to Ripley (2005), research has shown that people will first check with several sources before deciding what to do just like the neighbor in the above scenario. This “freezing” behavior is instinctive. When people are caught up in a disaster, 10-15% will act quickly and properly, 15% will “freak out,” and the rest will do very little, stunned and bewildered (p. 60). That is why pre-planning is crucial.

a. *Brain Power*

The research shows that in an emergency, the brain slows down. Simple decisions may take several minutes to make under stress and the bombardment of new information. The same decisions when you are calm may take only seconds. Because time in the throes of a disaster may be exceedingly short for correct decision making, to increase the likelihood of survival, prior planning and a form of mindfulness (or of being in-the-moment) are a must (Breen, 2000; Campbell, 2000; George, 2010; Kahneman et al., 1982, 1999; Lerner, 1980). This objective not only applies to individuals, but according to the research, can be applied to municipalities, states, regions, and the nation as well.

b. *Rebuilding Complacency*

The Multihazard Mitigation Council of The National Institute of Building Sciences (NIBS) published two reports on *Parameters for an Independent Study To Assess the Future Benefits of Mitigation Activities* in 2005 and 2010, respectively. In both volumes, the reports take a tour of “America’s Hazardscape.” Specifically, they look at New Orleans and the Gulf Coast following Hurricane Katrina, and at the state of Louisiana, in general. They comment on how this city and state have since passed new mandatory building codes similar to the state of Florida’s stringent 2001 building codes, which specifically relate to hurricane preparedness. They compare those codes with the state of Mississippi where 68,729 homes were lost in Katrina, yet its mandatory building

code was voted down and is now only voluntary. The reports examine and compare the Northeastern states, particularly New York, which they claim, according to insurance-industry risk assessments, ranks as being the number two worst place for a hurricane to strike based on population, area, and rebuilding costs (second to Miami, FL).

c. Toughen Up

The NISB reports, similar to Ripley's "Why We Don't Prepare for Disasters" article (2006), question the allowing rebuilding in areas that are not just prone to flooding, but that flood repeatedly. They all but fault federal, state, and local governments for not taking tough enough steps to stop the redundant cost of rebuilding in storm-prone areas. The NISB conveys that for every dollar spent on basic preparedness and basic mitigation strategies, society saves an average of \$4 in response, recovery, and restoration (2005). A positive example of tough decision-making strategies occurred in the Midwestern U.S. after devastating flooding in 1993. The federal government managed to buy out flood-prone properties. In partnership with state governments, the federal government bought 25,000 properties and thousands of acres of property, which were converted into wetlands. Those wetlands will now act as a buffer (or a sponge) to reduce the effects of storm surges. According to James Lee Witt, then the FEMA director, since 1993 "we never spent one dime on responding to those areas. Nobody lost everything they worked for" (Ripley, 2006, p. 6).

d. New Building Codes

Disseminating the research to help answer the question of what can be done to increase the chances that civilians will make the correct choice of action in emergencies and disasters, it was also found that in 2009 new comprehensive building and fire codes were approved by the International Code Council as recommended by the U.S. Department of Commerce's NIST. These new building codes included stricter prescriptive changes—particularly in high-rise office buildings, following the September 11, 2001, attacks of the World Trade Center and the evacuations of those structures. Although these new codes include making exit-path markings more prevalent and visible, they also cover requirements to ensure effective radio communications for first

responders. According to the *Domestic Preparedness Journal* (Gross, 2010), apparently what these new codes failed to do is to include informing and educating building occupants on just how to properly find and use these upgraded exits to escape. This is where the application of appropriate legislation would come in. Local laws particularly have the opportunity to fill the gaps in federal laws and requirements. Local politicians can look at the laws and take proactive steps to make their constituents and communities safer.

e. Saving Pets Not Humans

Additionally, no federal law currently require state and local officials to plan (much less educate the public) for the evacuation of themselves, the sick, elderly, disabled, or poor. However, the research uncovered that in 2006 Congress *did* pass a law, the Pets [sic] Evacuation and Transportation Standards Act of 2006 (PETS), that cited how our city and state authorities' disaster plans do not take into account how to rescue the portion of the population who are pet owners. To qualify for FEMA funding, a city or state is required to submit a plan detailing its disaster preparedness program. The PETS Act requires that the state and local emergency preparedness authorities include how they will accommodate households with pets or service animals when presenting these plans to FEMA. Congress felt this bipartisan legislation was necessary because Hurricane Katrina has clearly shown that when given a choice between their own personal safety or abandoning their household pets, a significant number of people will choose to risk their lives to remain with their pets. "It is now clear that requiring these jurisdictions to have plans in effect to deal with their pet-owning populations is a matter of public safety" (Pets Evacuation and Transportation Standards Act, 2006). So, why is Congress able to pass laws concerning pets but not people? I suspect because it is easier than attempting to tell American citizens what to do for themselves, especially at the federal level.

f. Conclusion

To increase the chance that civilians will make the correct choice of action during emergencies and disasters, the research shows that we must first provide them with information of their vulnerabilities and the necessity of preparedness. We must

educate them in the possibilities and realities of human reactions so that they may identify how to remain prepared and maintain a mindful state during emergencies. Further, we must attempt as a nation to reduce risk by not placing communities in the most vulnerable of locations and regions. And lastly, government entities must make sound and tough decisions on protecting the people so that we don't intentionally allow them in harm's way.

C. DISCUSSION

A thesis is often broadly referred to as a doctrine that results from original research, designed to maintain or promote an argument or a proposition. It is put forth for consideration, and is designed to be discussed and defended against objections. Arguably, it is also understood that the result of such work is to add to the common knowledge of man and to promote a higher level of learning and understanding on a given topic. A greater achievement would be to have the outcome be used to positively affect the lives of others. It is that final thought that has propelled me through this process.

Throughout the development of this thesis, I can honestly say that I learned a great deal from writing it and I hope that all who read this will learn a great deal as well.

1. Why? Because Y Is a Crooked Letter

To ask such a seemingly infinite question as *Why Do Some People Live and Some People Die During The Same Emergencies and Disaster?* might lead one to imagine that the vastness of the variables involved in answering such an inquiry would be insuperable. However, as I hope the research has proven, it is not. The research presents the argument that there are indeed very measurable and specific reasons related to styles of cognition and decision making. That is why people who find themselves in the middle of disasters can have different life-and-death outcomes. Granted, there *are* certainly situations where the fragile mortality of a human life occurs in such fractions of seconds that they are devoid of any chance for survival. However, as reflected in the case studies found within this research, more often than not, that is not the case.

2. Themes and Memes

The central theme enabling us to answer the specific research question is identifying the presence of a knowledge gap as opposed to a policy issue. Although political, public, private, and individual policies can readily be seen as lacking when it comes to emergency preparedness; it is the acknowledgement that emergencies and disaster *can* (and *do*) happen to each of us, that is the more significant of the two concerns. Cultural memes, such as complacency, compliance, and taking action (or inaction) in given situations are the very concerns that I hope to affect with this research. *Can the General Public Be Taught to Save Themselves?* The answer to this part of the research question is an emphatic, YES! But, how then?

Throughout the literature review, the reoccurring themes that emerge and offer insight into the survival knowledge gap are education, information, and practice. These three broad elements present what appear to be the keys to human survival (Campbell, 2000; DeBecker, 1997; Frey et al., 2010; Gonzales, 2003, 2008; Hall, 2011; Kahneman et al., 1982; Keating et al., 1981; Latane et al., 1968; McLennan et al., 2011; NIST, 2009, 2010; Pittman, 2012; Ripley, 2006, 2008; Schroll, 2002; USFA, 2002, 2011b, 2011c; VonAppen, 2012; Winerman, 2004).

3. Bon Voyage

As presented in the results section, cruise ships are required to present safety briefings to every passenger on board—or who may subsequently board—the ship, prior to leaving port. Is that due to the overwhelming loss of life that occurs due to cruise ship disasters every year? Of course not. The requirements behind such procedures arose mostly out of the sinking and loss of life of the *General Slocum* (1904), the *Titanic* (1912), the *Lusitania* (1915), and the *Costa Concordia* (2012). However, these most famous of shipwrecks—although they accounted for a combined total of 3,467 deaths—that number merely equals the over 3,000 U.S. fire-related deaths that occur *every year* in this country (United States Fire Administration, 2011b). They also are several hundred fewer than the approximately 4,700 work-related fatalities that occur in the U.S. *every year* (Bureau of Labor Statistics, 2012). Yet, with fewer than 200 fatalities on cruise ships

over the last four decades (Lipcon et al., 2013), the safety briefings that may save your life when you are out at sea are conducted at the beginning of every voyage.

Conversely, over the same four decades, the U.S. has suffered over 3,000 hotel fires each year resulting in the loss of several hundred lives (Evarts, 2012). Yet, when we check in there is not even a mention of safety measures and we are left to our own devices.

During the above research, it became clear to me that many more civilians are at risk of dying in hotel fires in the U.S. than on cruise ships. Considering the hotel fire and fatality statistics above, the potential for a catastrophic hotel fire in the U.S. may be just around the corner. It appears that having a hotel doorman or bellhop escort each guest to their room and give them a short safety briefing on the exit locations, smoke detector and sprinkler locations, and to point out the fire safety card found on the inside of every hotel room door for further information would be a basic fire prevention ordinance. Unfortunately, it is not.

4. Trickle-Down Apathy

Getting back to more general emergencies and disasters and teaching civilians how to save themselves, we just need to look at the auto industry and safety cultures. When the American public cannot be trusted to save themselves, the government steps in for them—at least that's the story of mandatory car insurance, seat-belt laws and smoking bans (however, after Hurricane Katrina [2005], Irene [2011], and Sandy [2012], flood insurance has only been made mandatory for approximately 20% of U.S. homes that are at risk of floods [Ripley, 2006]). When it comes to preventing disasters, or taking measures to protect yourself, your family and your property, the rules are different. The message from the government is consistent: We will help you build where you should not build, we will come and rescue you when things go bad, and then we will help you rebuild again in the same location. One encouraging note to that story is that after personally experiencing a flood loss during Hurricane Sandy (while attempting to complete this thesis), I found that my neighbors who did not have flood insurance were forced to sign up for it *before* FEMA would consider them for disaster assistance.

It appears to me that generally, some politicians shy away from tough issues especially if they are unpopular. However, in the recent years in places like New York and New Jersey, the politico's did speak frankly, sternly and in some instances threateningly, when describing the possible effects of Hurricane Irene (2011) and Hurricane Sandy (2012).

In the wake of these two hurricanes and the devastation they caused, these same politicians had an opportunity to right some of the wrongs and to get homes out of the most vulnerable areas, or significantly alter them so they may remain. Only New Jersey has implemented new stricter hurricane construction and building codes in those areas. I have to question if that is enough. What about the federal government? Are the FEMA and the National Flood Insurance Program going to keep re-insuring and paying for homes that have been damaged or destroyed in flood zones in either one or both of the storms? At this point, it looks like they are. But why? FEMA and the federal government may need to take tough stances and perhaps provide monetary assistance so that we do not keep responding to the same disasters, in the same communities, year after year.

5. Dissenting Opinions

One difference of opinion from the mainstream research findings was that of the Australian government and emergency services. As pointed out by McLennan et al. (2011) while concluding their research on the Australian bushfires of 2009, they wrote, "When the primary strategy for community-based protection becomes one of removing people from the threatened locations, such a blanket approach may have unintended negative consequences" (p. 45). The researchers contend that those consequences may result in reducing the overall level of community knowledge and understanding about how to survive the impending disaster if they become entrapped. This approach alone offers no education on reducing risk and vulnerabilities. Nor does it address the possibility that the emergency services may be unable to reach those that are trapped in a timely manner.

After living through Hurricane Sandy in New York on October 29, 2012, and as a first responder charged with protecting my members and having to conduct rescue

attempts for several people who ignored the mandatory evacuations, I can say that I agree with the researchers. McLennan et al. argue that the overemphasis on simply being somewhere else when the emergency occurs may not give people the knowledge of how to protect themselves and to make proper decisions. They liken this to the similarity of the “just say no” approach to sex education and drugs (p. 45). That approach offers no real insight into the hazards of indulging in either activity and they do not offer alternative solutions. McLennan et al., feel that the fire and emergency services may be at risk of promising, inadvertently, more safety than they can guarantee. It is my position—as argued in this thesis—that if we equip the public with the knowledge (not simply information) and training of the skills they may need on how to act and what is important concerning given disasters, they may actually be better off when the emergency services cannot be there to help. Part of that information is also to evacuate immediately when told to do so.

A second differing opinion found in the research was one presented by VonAppen, 2012. VonAppen relates a *near-miss* scenario where a group of experienced and well-trained firefighters were caught in a life-and-death struggle when they were overrun by flames, smoke and intense heat. VonAppen discusses that if the professionally trained firefighters in the scenario were not able to set aside their emotional responses and to safely remove themselves from this untenable situation, what chance would untrained civilians have under the same circumstance?

I challenge this theory of civilians being unable to set aside their emotions to enable them to make better decisions. In the grave circumstances that these firefighters found themselves in they were equipped with protective gear that bought them precious seconds to make life-altering decisions. Civilians who would find themselves in a similar untenable position without the protection of that same gear would most likely have perished on the spot due to the superheated gases and thermal assault to their bodies and organs. Therefore, they would not have had the same opportunity, and the same kind of crisis decision making and emotional wrestling that the firefighters were exposed to.

However, prior to that specific event, if a civilian had been in the same fire but in a different location within the structure that the firefighters were in, there may have been time (albeit limited) for them to make decisions to escape.

The idea that humans may be unable to set aside their emotions during extremely life-threatening events is exactly contrary to my beliefs based on the research. If people can be educated as to what their likely reactions might be to life-threatening stressors they may be able to concentrate on decision making rather than their emotional reactions to what is going on around them and how they would like it to be. It has been said that emotions trump reason in emergencies. However, considering the experiences found in the literature review concerning having to make decisions under stressful conditions (as seen in the World Trade Center attacks), emotions may be subdued in lieu of concentrating on taking action, but only if they are rehearsed and thought about ahead of time.

6. Community Up Reach

Recognizing a connection between community *outreach* and information *uploading*, an idea emerged from the research about how to connect disaster management with the business and private worlds. The idea behind the Community Emergency Response Team (CERT) program has swept the nation after September 11, 2001. The program forms neighborhood teams of civilians who are taught basic skills to take care of themselves, their property, and their neighborhoods (in that order) in the event that the emergency responders are overwhelmed, unable to respond, or during those critical initial minutes when they are en route. The CERT program has proven successful in getting the word and training out to the communities, and arms them with information, education, and practice. Although it only reaches a dedicated small group of individuals, they are able to take what they have learned and pass it on to their family and neighbors. The structure of the program is one that can be adapted to educate office employees and homeowners alike. Today, with the availability of social media, computer-generated, scenario-based training aids and a willingness of employers to allow workers to train on “company time” (or to meet legislatively mandated requirements) may make this type of

emergency education readily accessible. The benefit to building owners, business owners and managers would be reduced insurance premiums, and the benefits of a better educated and well-rounded work force. The employees can take the information they learned home with them to practice. Now, when an emergency does occur in the workplace or at home, employees may be better equipped to handle it and either continue on at work or leave home to get to work sooner than they might otherwise be able to. A side benefit would be that employees might be less likely to need time off or away from their job if they can handle emergencies rather than needing someone else to handle it for them.

7. To Evacuate or Not to Evacuate, That Is the Question

One phenomenon that I witness time and time again in my line of work as a New York City firefighter is that Europeans generally tend to take fire alarms much more seriously than Americans. Responding to false alarms in hotels in my fire company's response area is not uncommon. The Americans tend to stay in their rooms and wait to see if it is a false alarm or not, where the Europeans more often than not meet us in the lobby or the street. When I have asked those who evacuated about their attitude and actions, they say that in Europe the population is reminded about fire safety daily on television, radio and social media. Due to its history (primarily bombings of World War II and more recent terrorist attacks), Europe is more of a proactive and preventative culture compared with the U.S. concentration on reactionary response.

Gershon et al. (2007) found that in the World Trade Center (WTC) on September 11, 2001, factors that influenced individual evacuation included: perception of risk (from sensory cues), preparedness training, the familiarity of the building, physical condition, health status, footwear, and individual behavior, which was affected by group behavior and leadership. At the organizational level, evacuation was affected by worksite preparedness planning (individual offices and the WTC site), including the training and education of building occupants, and communicating risks to occupants. Still, over 3,000 perished in those attacks, several hundred of them due to the fact that they didn't evacuate immediately when they felt something had gone terribly wrong. Many

participants who delayed evacuation did so because they were unable to walk down stairs; they were unfamiliar with the building layout, stairwell locations, and termination points. Only a small number of people stated that company managers led the way out of the buildings (see Table 1). Gershon et al. surmise that environmental cues play a key role in risk assessment. People who are not exposed to obvious cues were more likely to delay evacuation, presumably because they did not feel an immediate threat. Additionally, Gershon et al. concluded that individual knowledge and organizational preparedness were important factors in evacuating.

They also found that individual emergency experience could mitigate gaps in organizational preparedness and could, to some degree, compensate for individual preparedness deficiencies. Orientating high-rise occupants to building features and adding a plan for visitors and new employees are important for safety managers to address (p. 7). Once again, concurrent themes that represent the keys to survival were education, preparation and practice (See Table 2).

Decision to Initiate Evacuation	Facilitators	Barriers
Individual Factors	<ul style="list-style-type: none"> - Emergent cue perception. - Intuition. - Prior experience (WTC bombing, 1993). - Thought it a terrorist event. - Knew how to evacuate. 	<ul style="list-style-type: none"> - Low knowledge level of building/exits. - New to job/building. - Delaying behaviors. - Unsure of physical abilities.
Organizational Factors	<ul style="list-style-type: none"> - Instructed by person in charge. - Instructed by colleague. - Persuaded by authoritative voice. 	<ul style="list-style-type: none"> - No guidance provided. - Ambivalent/contrary messages provided. - New managers unsure of procedures. - PA announcements to stay or return to offices.
Environmental Sensory Cues	<ul style="list-style-type: none"> - Heard/saw/felt explosions. - Saw plane strike/flash of light. - Bldg. lights flickered. - Smelled/saw smoke/fuel. - Saw debris out of window. 	<ul style="list-style-type: none"> - Received no cues. - Communication failures. - Lack of communication.

WTC = World Trade Center, PA = Public Address System

Table 1. Key Factors Related to Initiation of World Trade Center Evacuations

Clearly, education, and familiarization of employees and managers at the WTC played an important role in the saving of tens of thousands of lives on September 11, 2001. I contend that the research provided herein demonstrates that information, education, and practice will save people's lives in other, more common emergencies and disasters as well.

Evacuation Progress	Facilitators	Barriers
Individual	<ul style="list-style-type: none"> - High rise fire safety training. - High building knowledge. - Good footwear. - Followed crowd. - Followed supervisor/leader. - Encouraged to keep moving by others/firefighters. 	<ul style="list-style-type: none"> - Poor physical condition. - Low levels of safety knowledge. - Inappropriate footwear.
Organizational	<ul style="list-style-type: none"> - Good Management. behavior/directions. - Firefighters assisted with directions. - Encouraged to keep going. 	<ul style="list-style-type: none"> - Stopped when told to (PA) "All safe, return to office." - Lack of directions out of building.
Environmental	<ul style="list-style-type: none"> - Strong cues witnessed. - Supportive group behavior. - Stairwells in good condition 	<ul style="list-style-type: none"> - Debris on stairs. - Smoke in stairs. - Crowds in stairs. - Slow moving people in stairs. - Locked doors on landings. - Debris in lobby. - Rare social disorganization. - Shoving in lobby to exit.

Table 2. Key Factors Related to Progression of Evacuation

8. Political Will

Dartanner (n.d.) discusses how some people who have never been personally affected by a natural disaster often decide (consciously or subconsciously) to not deal with the subject at all, and that can be a dangerous mistake. It occurred to me that politicians are no different from the general public when it comes to disaster preparedness. However, their constituents may not want to hear that. Not that the elected officials are above the law or expected to be less than human, but what they are expected to do is to be a manager and to take matters of the public (in this case safety preparedness) into consideration. Therefore, they need to be educated as well. Although many politicians are able to rely on emergency management professionals to make suggestions and take the lead in emergencies and disasters, the individual politician must

also be able to set aside their emotions and make critical decisions that may save countless lives. Accomplishing such goals should reasonably be accomplished through prearranged relationships, mutual respect, and understanding of roles and responsibilities. For emergency managers, taking advantage of teachable moments with politicians pre-event is perhaps the best form of sharing information, education, and preparation.

9. Conclusion

Throughout the development of this thesis, I have learned a great deal. As with most research goals, I hope to have afforded the reader an opportunity to learn as well. The overall achievement threshold is to be able to positively affect the lives of others who will—at some point in their lifetime—find themselves faced with an emergency or disaster. With that sentiment, the research recommendations will be presented as an opportunity to educate, inform, and arm the general public with the necessary cognitive and psychomotor skills that may be required to help save themselves in emergencies and disasters.

D. RECOMMENDATIONS

Through in-depth research and analysis, the thesis author has developed specific recommendations regarding the question of why do some people live and some people die in the same emergencies and disasters; and how the general public can be taught to improve their chances of survival. Although the scope of the recommendations are made specifically for the New York area, they can also be applied throughout the United States.

To implement the following complex adaptive system thesis recommendations (a.k.a. *strategy*), a great deal of collaboration will be required. The key players/stakeholders to facilitate such recommendations have been identified as: the FDNY, specifically, the Fire Commissioner; Fire Prevention Bureau and Bureau of Legal Affairs; The New York City Mayor's OEM; the New York City Council; federal, state and local lawmakers; private building owners; and the public at large who live and work within the boundaries of the City of New York.

The first problem with such an expansive list of required stakeholders would appear to be the successful convergence of such a multitude of resources. However, they are in fact already assimilated toward achieving such a common goal. One of the positive results of the terrorist attacks of September 11, 2001, was the adoption of New York City's Local Law 26 of 2004 and the subsequent 2008 New York City Building & Fire and Life Safety Codes. Local Law 26 requires the Fire Commissioner to adopt standards, procedures, and requirements for the protection of occupants in certain office buildings in response to both fire and non-fire-related emergencies. Those emergencies could include explosion, biological, chemical, radiological, nuclear, natural disaster, or the threat thereof, or a declaration of emergency by lawful authority. As mandated in the Local Law, the Fire Commissioner published Rule 6-02 of *The Rules of The City of New York* (3 RCNY 6-02), which requires that each office building subject to the requirements of the rule prepare a written Emergency Action Plan (EAP). Each EAP must meet a uniform and required format and must be submitted for approval to the FDNY within one year of when the law went into effect.

The thesis recommendations present incremental innovations that simply expand on the previously acceptance of these specific laws. As such, these thesis recommendations will not have the same potential vulnerabilities to corporate and political agendas as most of them would encounter if presented today on their own. Each of the recommendations has been dealt with previously by all the identified stakeholders prior to the adoption of the existing laws.

1. First Recommendation

The first recommendation of this research is to amend current local legislation to require minimally accepted quantities of both written and hands-on fire and life safety training to all commercial building occupants in New York City. This would include new employees within a one-month period of being hired. Addendums to the RCNY 6-02 should include annual drills on related topics, such as building emergency protection and detection systems, basic fire safety, emergency notifications, and stairwell familiarization.

The start of such addendum modifications to the RCNY 6-02 fall well within the legal purview of the Fire Commissioner and this recommendation will be forwarded to him for such purpose. One anticipated roadblock to this recommendation might be the reluctance of the Fire Commissioner to place additional burden on businesses and their employees. The arguments to push past this roadblock are self-evident. They are the same arguments that lead to the passing of Local law 26 and RCNY 6-02 in the first place: To provide education and practice drills to reduce the loss of life during fires, emergencies and other natural or manmade disasters.

Local Law 26 and the RCNY 6-02 address many issues regarding commercial buildings including construction, demolition and abatement, building codes, and fire and life safety codes. They establish the designation and certification of Fire Safety Directors; EAP Directors and Deputy Directors; and Site Safety Manager/Site Fire Safety Directors. Each of these titles requires training and certification by the FDNY. Additionally, Fire Safety/EAP Fire Brigades consisting of Building Managers, Chief Engineers, and the Director of Security are all identified—by name—as responsible and integral parts of the EAP.

In addition to developing procedures for sheltering in place, in-building relocation, partial building evacuation, and full-building evacuation, all of the above named individuals are responsible to train subordinates on the EAP and each of its phases of implementation. Those subordinates include Building Evacuation Supervisors, Fire Wardens on each floor, and Assistant Fire Wardens in each commercial office space. Therefore, the groundwork and working relationships (or complex predictive planning scheme) for the first strategic recommendation of this thesis is already previously established. The recommended addendums to the current laws are designed as a bridge to span the knowledge gap between the current law's failure to address minimum training standards and time frames, and the realization of educating commercial building personnel and the occupants therein.

2. Second Recommendation

The second recommendation of this research is to enhance the efforts of emergency responders in public education. An emergent and formalized strategy of education in the EAP coupled with insight into the lack of public understanding and perception is required on the part of emergency responders, specifically members of the FDNY. It is recommended that a realistic scenario-based lesson plan and course (of less than four hours) be developed within the FDNY Bureau of Training. The established training can be provided to each firefighter and fire officer during their respective Annual Education Day. The objectives of this training will include the understanding of EAP requirements and processes; a brief introduction into the psychological aspects of how the general public react in emergencies and disasters; and finally, the review of survival stories from office workers and building personnel who evacuated the World Trade Center on September 11, 2001. Additional case studies of high-rise commercial occupancy emergencies and disasters should also be included.

a. Anticipated Arguments

The arguments anticipated with this second recommendation might be the reluctance of firefighters to accept the responsibility of going out and educating the public. Firefighters may not fully understand the influence that their position generates among the general public. In reality, the very calling of firefighting and the public's perception and respect of these individuals make the relationship ripe for cultivation. Further anticipated roadblocks might include the abundance of training items that compete for the firefighter's time, as well as union issues if the training were performed on other than the scheduled Annual Education Day, or the perception of this responsibility as additional work that is to be compensated for.

The fundamental responsibility of firefighters to perform fire prevention education would take care of the former anticipated argument, and the delivery of the aforementioned course on the scheduled Annual Education Day would quell the latter argument.

3. Third Recommendation

The third and final thesis recommendation is to develop public/private partnerships to provide realistic information and scenario-based drills that the public can comprehend and participate in. Although leveraging the legal regulations and enforcement of Local Law 26 and RCNY 6-02 can help make this particular strategic plan somewhat resilient (not to mention a potential money maker for the city), it would not do anything positive to build a cooperative working environment with building and business owners or their stakeholders. An additional approach to legislation is the education component. It must be pointed out to businesses and building owners that the education of employees can, and has, saved hundreds of millions of dollars in direct and indirect business losses, in addition to limiting liability vulnerabilities. Each of these considerations affect the bottom line while at the same time limit loss of life.

An anticipated consequence of this recommendation may be the receipt of significant reductions in insurance premiums that may be applicable through the very action of making the work environment safer for all employees. Additionally, Occupational Safety and Health Administration (OSHA) mandates may also be ancillary concerns that can be overcome or corrected through employee education and an acquired state of safety *mindfulness*.

a. Anticipated Obstacles

One of the biggest obstacles of implementing the complex adaptive recommendations of this thesis recommendation is the time allotment required of the participants (employees). The RCNY 6-02 calls for the use of instructional drills, stairwell familiarization drills, or both. Although instructional drills can vary in design, length, and approach, they are meant to familiarize building occupants with the requirements of their particular building's EAP. These requirements cost time, and to the business community—time is money.

b. Learn, Adapt, and Overcome

To overcome these concerns, technological integration as part of the process is recommended. Incorporating the technology sections of the Naval Postgraduate School Center for Homeland Defense and Security's (CHDS) Master's Degree Program, readily available computer-based simulation and imagery programs can be utilized. The recommendation would require the employees/occupants to spend just 15 minutes per week to log on and participate in given scenarios and make multiple-choice decisions based on the given situations, and receive immediate feedback on why a chosen decision was correct or incorrect. The additional option of looking at why the other optional decisions would have been more or less correct are excellent options to allow the adult learner to receive instant gratification, as well as valuable feedback. The one component that cannot be simulated (except for the stress of having to complete each scenario in a limited time frame) would be the fear factor of making the wrong life-or-death decision.

However, as shown in the research concerning immediate decision making, even if these decisions are wrong, they will buy time for the person to make additional and possibly more correct decisions. The hesitancy of making a decision until it is too late always limits the choices and, if an incorrect choice is made, there may be no time to recoup and make additional choices.

Information technology departments can track the required participation, as well as the progress of the employees/occupants. Automatic email reminders can be sent out throughout the workweek to remind employees and managers of the required participation. Additional benefits are that the computer programs can rate and score employee decisions, show them possible consequences of both correct and incorrect choices, and track individual employee/occupant progress.

Public/private partnerships can solve the dilemma of development (there are already many computer-based training software programs available on the market)

and the issue of making them available to workers/occupants during working hours. Perhaps the cost of such training could be shared by the building owners, business owners, computer software companies, and insurance companies.

Cost savings by allowing occupants to take the training at their convenience, and the use of Big Data to track training and individual progress would prove to be most beneficial of options. This leverage could also be used to pressure occupants to actually take part in the training and required EAP familiarizations. Additionally, the legal requirements and the associated documentation of all training would assist in making these innovations more attractive to the corporations that are required to use them.

4. Future Research

Recommendations for future researchers of this topic would be: (a) to perform direct interviews of emergency and disaster survivors. The focus of those interviews would be to see how, if at all, heredity, intuition, life experiences, preparedness education, individual preparedness (prior to the event) and their values and attitudes may have played a role in their survival; (b) To organize an educational curriculum for the public on general emergency planning; and (c) At the doctorate level, to provide an educational emergency preparedness program to a given audience (perhaps an office building or similar workplace) over a finite time period (say a matter of months so as to reach every office and every employee). Once everyone has been trained, perform a drill scenario—perhaps incorporating smoke machines, nighttime hours (for an element of unfamiliarity, stress, and discourse), and not allow the use of one or more normal exit routes (to present decision-making challenges)—then document the actions of the participants and document the results. Additionally, it may prove beneficial to perform the same scenario prior to the delivery of the training to gauge occupant improvement. (d) Work with local politicians and policy makers to positively affect the emergency preparedness of your community by enacting educational programs, drill requirements, and updated emergency action plan legislation.

E. SUMMARY

Throughout the Literature Review and research Methods and Procedures, three common threads consistently emerged: (a) In most emergencies and disasters (but certainly not all), people who survived made a conscious decision to take immediate action; (b) In most instances, survivors had planned ahead or been mentally prepared to deal with emergent circumstances before they occurred; and (c) education in emergency actions and planning, the gathering of information, and clear communications all play a role in civilian survival. These three common themes directly correlate to the problem, purpose, and research question of this thesis—Why do some people live and some people die in the same emergencies and disasters, and can the general public be taught to save themselves?

The organizational steps of this research were to compile and examine published literature on human reactions and decision making, and to then merge them into a singular discussion on the main research topic. The reason for selecting particular case studies and scientific research found within this thesis are the correlations shown between the science of human behavior and the reality of those behaviors in everyday, real world scenarios.

Overall, the implementation strategy of this thesis is one of coordination, integration, and convergence. Coupling existing emergent technologies, laws, and current, formalized strategies, will be the keys to implementation success. The implementation plan will expand and grow as the recommendations are adopted and subsequently tested throughout the over 800 high-rise office buildings in the City of New York.

Once it is understood why some people survive and some people die in the same emergencies and disasters, we can begin to take action against the prohibitive nature of the human condition. Identifying how and why people act or react the way they do allows us to work within those constraints to teach people how to overcome their inherited or acquired handicaps.

APPENDIX A.

An overview of influential factors for phases 1 and 2 of the behavioral process
(NIST, 2009)

Factors	Phase 1: <i>Perception</i>	Phase 2: <i>Interpretation</i>	
		of a fire	of risk to self/others
<u>Occupant-based pre-event:</u>			
Has experience with fires? (Yes)	Increases	Increases	Increases
Has knowledge of fire training? (Yes)	Increases	Increases	Increases
Habituation with environment? (Yes)	Decreases	**	---
Knowledge of evacuation route? (Yes)	---	---	---
Experience with false alarms? (Yes)	---	Decreases	---
Feels secure in building? (Yes)	---	Decreases	---
Has perceptual disability? (Yes)	Decreases	---	---
Age (Older adult >25 years old)? (Yes)	Decreases	---	---
Female gender? (Yes)	Increases	---	---
Speaks same language as others? (Yes)	Increases	---	---
Frequent interaction with family? (Yes)	Increases	---	---
<u>Occupant-based event factors:</u>			
Has a higher stress/anxiety level? (Yes)	Decreases	---	---
Perceives a time pressure? (Yes)	Decreases	Decreases	Increases
Others (loved ones) present? (Yes)	Decreases	---	---
Proximity to fire/sees fire? (Yes)	Increases	---	---
Sleeping? (Yes)	Decreases	---	---
High # of behavioral processes (>1)? (Yes)	---	Increases	---
Able to define event as a fire? (Yes)	---	N/A	Increases
<u>Cue-based factors:</u>			
A higher # of cues? (Yes)	Mixed**	Increases	Increases
Receives consistent cues? (Yes)	---	Increases	Increases
Unambiguous cues? (Yes)	---	Increases	---
Social cues consistent with understanding a fire situation? (Yes)	---	Increases	Increases
Official source? (Yes)	Increases	Increases	---
Familiar source? (Yes)	---	Increases	---
High dose of toxic gases? (Yes)	---	Decreases	---
Extreme/dense cues? (Yes)	Decreases	---	Increases
Visual/audible alarm cues? (Yes)	Increases	---	---
Risk information? (Yes)	---	Increases	---

Areas where no research was found marked by “---”; conflicted research on direction of factor influence is marked by **.

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APPENDIX B.

Stephen Marsar's Roadmap to Success



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APPENDIX C.

Stephen Marsar Thesis Required Elements and Timeline

SECTION		TARGET DATE	COMPLETED	Advisor 1	Advisor 2
1.	Title Page _____		<input type="checkbox"/>		
2.	Executive Summary _____		<input type="checkbox"/>		
3.	Introduction _____		<input type="checkbox"/>		
4.	Table of Contents (Separate page) _____		<input type="checkbox"/>		
5.	Main Body Sections			X	X
	Introduction (Separate page) _____		<input type="checkbox"/>		
	Background & Significance _____		<input type="checkbox"/>		
	Literature Review _____				
	Methods _____		<input type="checkbox"/>		
	Results _____		<input type="checkbox"/>		
	Discussion _____		<input type="checkbox"/>		
	Recommendations _____		<input type="checkbox"/>		
6.	Reference List (Separate page) _____		<input type="checkbox"/>		
7.	Appendices _____		<input type="checkbox"/>		
	(Separate pages as needed)				

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